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ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with every copy of this week's issue

The Railways and an Emergency

THE Minister of Transport has already announced that in the event of an emergency the British railways will be taken over by the Government and run under his direct control through the medium of the Railway Executive Committee, and has pointed out that in every phase of this country's wartime activities the railways would have a key part to play, especially in the evacuation of large towns, the clearance of ports, and the transport of food supplies and personnel. Obviously it is not in the national interest to disclose details of the exhaustive plans which have been made to enable the railway organisations to meet possible eventualities, but certain information has been made public indicating some of the activities in which the railways are directly concerned and the steps they are taking. Recognising the vital nature of railway transport to the country's defences, the Government has authorised the railway companies to carry out special protective works. A total expenditure of £4,000,000 is being financed by the Government, and already over £3,000,000 has been sanctioned. In addition to substantial structural alterations to railway properties, including control offices and signal boxes, in order to afford protection to men at work, shelters are being obtained and placed at strategic points for the use of railway signalmen. Protective clothing is being provided for essential staffs. In co-operation with the Post Office authorities, steps have been taken to arrange alternative railway telephone circuits, both for the carrying on of the essential work of the railways, and also to ensure the more rapid dissemination of air raid warnings and information. Considerable work has also been done in accumulating at strategic points stocks of vital materials such as sleepers, timbers, bridge girders, rails, electrical equipment, locomotive spare parts, and track materials.

* * * *

Government Evacuation Scheme

In connection with the evacuation plans, detailed arrangements have been completed for the rapid movement by special trains of 4,000,000 people from the industrial areas, and some 1,200 de-training stations have been selected. The necessary timetables have been printed and are stored in readiness, and the distribution by rail of emergency food supplies for the evacuated population has been arranged. The railway companies have also prepared emergency headquarters for use if necessary outside the London Area, as well as protected quarters for those members of the administrative and operating staffs who will be responsible for the movement of trains, and other essential services. During an emergency the evacuation arrangements and the extensive movement of His Majesty's Forces and their equipment will have priority, and public announcements would be made as to the passenger and freight services which were being maintained. The closest co-operation is being maintained hourly between the railway administrations, the Ministry of Transport and various Government departments regarding the details of planning to enable full advantage to be taken of the comprehensive organisation which the railways possess, should the need arise.

* * * *

The Week's Traffics

Traffics of the four main-line railways for the past week show an increase of £221,000 in comparison with the 28th week of 1938, following an advance of £212,000 in the 27th week. To date the total earnings are £84,515,000, an increase of £916,000 or 1·10 per cent. over 1938.

	28th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	− 24,000	+ 87,000	+ 18,000	+ 81,000	+ 283,000	+0·84
L.N.E.R. ..	− 2,000	+ 34,000	+ 45,000	+ 77,000	+ 146,000	+0·59
G.W.R. ..	− 4,000	+ 38,000	+ 14,000	+ 48,000	+ 404,000	+2·89
S.R. ..	+ 9,000	+ 7,500	− 1,500	+ 15,000	+ 83,000	+0·74

That the 1939 earnings as a whole remain below those of 1937 is apparent from the following table. For the 28 weeks there are decreases of £351,000 on the passenger side and of £1,074,500 in merchandise, although coal receipts are £364,500 up:—

	28th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	− 33,000	+ 18,000	+ 21,000	+ 6,000	− 550,000	−1·59
L.N.E.R. ..	− 14,000	− 15,000	+ 11,000	− 18,000	− 579,000	−2·28
G.W.R. ..	+ 3,000	+ 16,000	+ 4,000	+ 23,000	+ 50,000	+0·35
S.R. ..	+ 15,000	—	+ 3,000	+ 18,000	+ 18,000	+0·16

London Transport receipts for the first two weeks of the current financial year amount to £1,192,300, an increase of £56,200 over the corresponding period of 1938.

* * * *

Northern Railway of France

The report of the Northern Railway Company of France for the year 1938 differs from its predecessors in containing no details of its railway operations in France which, with those of the other main French railway systems, have been under the management of the French National Railways Company since January 1, 1938. As the Nord Company retains its identity it still possesses its *domaine privé* which consists of landed property not con-

nected with railway working, and of investments, &c. The report shows the financial results accruing in 1938 from its non-railway properties as fr.4,594,734 gross and fr.2,024,248 net, and the income from investments, &c., as fr.10,991,939. It also gives operating figures of the Nord-Belge lines which it continues to work. Under the reorganisation plan promulgated by decree on August 31, 1937, the Nord Company received 279,596 shares of fr.500 each in the National Company in consideration of the transfer of all its assets apart from the *domaine privé*. These shares will bear no interest until 1955 when the Nord Company will be dissolved and these shares divided among its shareholders. Meanwhile the Nord Company receives from the National Company annual payments corresponding to its guaranteed dividends, &c., and the dividends payable for 1938 are fr.70 on each capital share and fr.54 on each *jouissance* share.

* * * *

The "Square Deal" Explained to America

Although working conditions on the railways of North America are very different from those that obtain in this country, many of the problems affecting the prosperity of the railways are similar in both countries, as for example, the competition resulting from the phenomenal evolution of highway transport. Moreover, Great Britain and the United States are almost the only examples left of highly industrialised countries relying for their railway networks on company-owned and operated railways without any State subsidy. This was one of the points made in a paper read by Mr. C. E. R. Sherrington, Secretary of the Railway Research Service, before the annual meeting of the Accounting Division of the Association of American Railways in Toronto on June 28. Mr. Sherrington compared the Railways Act of 1921 with the Transportation Act, 1920, and reviewed the history of the British railways since amalgamation, describing the failure of the principle of the standard revenue, with an outline of more recent legislation and the events leading to the present situation. He then described the result of the campaign of the British companies for a "square deal."

* * * *

1,049 Miles at 62·3 m.p.h. with Steam

The steam services recently introduced between Chicago and Denver to supplement the popular overnight diesel services—the Denver Zephyr of the Burlington and the City of Denver of the combined Chicago & North Western and Union Pacific Companies—do not quite attain to the overall speeds forecast, but they do establish some new records for steam. Westbound, the C. & N.W. and U.P. have accelerated the Columbine sleeping car express to a time of 17 hr. 20 min. by their 1,049·1-mile route; this is 80 min. slower than the City of Denver, but it involves an overall average speed of 60·5 m.p.h., and, excluding stops, of 62·3 m.p.h. for the entire distance. Over the Union Pacific section the steam locomotives are required to cover the 513·6 miles from Omaha to La Salle in 8 hr. 3 min., including three intermediate stops with a total duration of 12 min., making in succession runs of 144·1, 137·2, 138·7, and 93·6 miles at start-to-stop speeds of 66·5, 66·9, 62·6, and 66·1 m.p.h. respectively. In comparison, the best long-distance French timing with steam —535 miles from Paris to Marseilles in 9 hr. 5 min.—is put well in the shade, and still more so the 9 hr. 45 min. of the best L.N.E.R. timing over the closely comparable distance of 523·2 miles between Aberdeen and King's Cross, which includes the Coronation service southwards from Edinburgh. The Burlington Company has also timed its new Overnite Denverite in 17 hr. 20 min. from Chicago to Denver, over a shorter route of 1,033·5 miles. Further details are given on page 89.

* * * *

Freight Facts

We recently heard a lamentation on the theme of public slowness to learn the goods transport facilities which the railways offer. It seems that inquiries are still being received asking whether the railways have a C.O.D. service, or some similar question to which the answer should by this time be engraved on every British heart. In these circumstances the men who have dedicated their lives to the transport of goods vent their understandable bitterness upon those who are supposed to make their work known to the public, and the advertising experts presumably retort by waving sheafs of posters and booklets in which the whole subject is explained in language at once simple and fervent. Another step towards public education in these matters has been taken by the British Railways Press Office in issuing a collection of "Four Hundred Freight Facts." They are divided and indexed under the heads of "Services & Equipment," "Facilities," and "Traffic & General," and their information is presented with the brevity, that aids memory. The whole C.O.D. service, for example, is set out in 10 "facts" averaging about 25 words each.

* * * *

The First Fatal Train Accident in Jamaica

Since the first railway was opened in Jamaica over 94 years ago, there had been no train accident fatal to passengers until the disastrous derailment of July 30 last year in which 32 persons were killed and 105 injured out of a total of about 300 on board. The 4-8-0 locomotive was derailed when travelling over a 5-chain curve at something like twice the permitted speed of 20 m.p.h. It came to rest almost at once, embedded in the steep side of a cutting, and the banking engine at the rear of the train, before the driver could realise what had happened, pushed the leading vehicles into a tangled mass of wreckage. Only the last four, three of which were covered vans, remained on the rails. The fourth vehicle behind the train engine was of steel construction, and seems to have suffered much less damage than either those ahead or that immediately behind it. A special commission was appointed to inquire into the accident and its report is summarised on page 110. The use of banking engines at the rear of trains has now been prohibited by Mr. H. R. Fox, the General Manager and Chief Engineer of the Jamaica Government Railways. At the estimated speed of the train on the 5-chain curve the irregularities found to exist in the track, combined with a sudden acceleration of the banking engine, would appear to have been sufficient to account for the derailment without the somewhat curious suggestion made in the report that the locomotive might have been "badly balanced."

* * * *

Flying-arch Struts between Cutting Walls

Nowadays the cross-strutting of retaining walls in a railway cutting can be effected satisfactorily in reinforced concrete. But in the early days of railways the engineer had to rely either upon flying arches in stone or brick, or on cast iron struts for this purpose. A notable example of cast iron work—on account of its extent if for no other reason—was on the steeply-graded approach to Euston from Camden. Both iron and arched strutting are still to be found here and there, and on page 106 we illustrate a fine series of masonry flying arches in Chorley cutting, between Euxton and Chorley on the Manchester—Blackpool line of the L.M.S.R. There are 16 of these arches springing from the buttresses of the retaining walls,

each having a span of 26 ft. 9 in. The crown of each is built of 11 single stones "with no visible means of support," and they are covered with stone slabs to protect them and their mortar joints from weathering. They were built in 1843, yet despite 96 years of exposure to the rigours of the Lancashire climate and constant vibration of a busy main line below them, the cost of their maintenance has been negligible.

* * * *

Paris Metro Extension Signalling

The Paris Metro line to Sceaux, once part of the Paris—Orleans system, has been fitted with automatic and power signalling as part of the electrification scheme. Some particulars of the work appear on page 92 in this issue. To ensure the maximum flexibility in working, the four-aspect system of indications has been adopted, for the first time in France and, we think, on the Continent; it provides two warning indications, similar in effect to our double and single yellow, at the approach to a stop signal. On the underground sections of the Metro the full block overlap has, as a rule, been used. Inductive equipment is used to repeat the signal aspects on the train; the warning aspects are accompanied by the sounding of buzzers, and the indications—visible to the guard so that he can act if the driver fails to do so—are recorded on the Teloc apparatus band, with the operation of the driver's vigilance handle. Route indicators are used at junctions, and the power frames, as was to be expected, are of the route-lever pattern. Key locking is used at the less important stations.

* * * *

Lubrication of Driving Journals

Evidence of the increasing tendency to substitute oil lubrication for grease is mentioned in one of the reports presented at the 17th annual meeting of the Mechanical Division of the Association of American Railroads last month, dealing with lubrication of locomotive driving journals. A new development, stated to be under test, was described. It incorporates a floating axle flooded in oil by a pump actuated from the movement of the locomotive and running in a bronze bushing. In conjunction with this a lateral device is employed consisting of a collar forged in the centre of the axle and to which wear resisting plates are opposed, and these, like the journal bearing, are flooded in oil. This, in effect, is a full floating axle and in view of the interest indicated in the application of oil lubrication to locomotive driving journals, the device holds interesting possibilities, and although the tests have not, as yet, progressed sufficiently to indicate the ultimate results that may be obtained, they have, it is understood, shown considerable promise. Similarly, pump-fed and spring-loaded pads have undergone a wide range of tests. Some difficulties have been reported due to broken springs resulting in failure to keep the pad of either device against the journal, but in general the service has been quite satisfactory and apparently difficulties are being overcome.

* * * *

Long Welded Rails

The practice of welding rails into long lengths is steadily increasing, partly in an endeavour to reduce the expense of the labour required in packing the sleepers at the joints due to the continual hammering of wheels passing over the unavoidable dip where the ordinary fishplate is used, and partly to obtain smoother running and less noise. Nevertheless, there remains a good deal of hesitation about the adoption of wholesale welding of rail joints owing to the uncertainty about the behaviour of long rails under variations of temperature. Evidence that the risks of buckling are not by any means insurmountable exists in the fact that it has for some years now been standard practice on certain Australian railways to weld rails on all lines into lengths of up to 225 ft., but there is less experience with long lengths of bull-head rail. In the tunnels of the L.P.T.B. railways 300-ft. lengths have lately been adopted as standard, but in these conditions temperature variations are negligible. For some time past the Southern Railway has had a number of 180-ft. lengths of rail under fast running on main line, and has made some interesting experiments in connection with them, an account of which is given on page 101 of this issue. One very noticeable feature of the down main line near Hildenborough, where some of the 180-ft. lengths are to be found, is the quietness and steadiness of running even at the high speeds common at this spot. This may, of course, be due partly to the special treatment of the formation here, which we described on December 3, 1937 (p. 983).

* * * *

The First 4-8-4 + 4-8-4 Locomotive

The first Beyer-Garratt locomotive to be fitted with an inside four-wheel bogie, a 4-6-4 + 4-6-4, was described in our issue of February 26, 1937. Another example of the inclusion of the four-wheel bogie on the inside of the engine units of a Garratt engine is the subject of an article this week. The wheel arrangement in this case is 4-8-4 + 4-8-4, and, incidentally, this is the first time such a wheel arrangement has been embodied in any steam locomotive. The engines, of which six have been built and another six are under construction, are for the Kenya & Uganda Railways. The huge boiler and extended wheel arrangement that this system of articulation permits is noteworthy, and the fact that the engine is to operate on a 50-lb. rail, has a maximum axleload of less than 12 tons, and can negotiate a 275-ft. radius curve, yet weighs 186 tons, makes this locomotive a conspicuous example of the designing capacity and ingenuity of the British locomotive manufacturer. The Kenya & Uganda Railways have used Garratt engines for many years, and before long the 879 miles of main line will be operated almost entirely by this type of engine, which is an indication of the state of reliability and availability it has attained, and how it can give to a railway restricted by a narrow gauge and light rail the carrying capacity of a standard-gauge railway.

* * * *

Some Curious American State Laws

America is the land of diversity within unity. All her 48 federated states manage to work amicably together, yet each is quite different in character from its neighbour. Each has its own legal system, and each lays down its own laws for the working of the railways passing through its territory. Many are good and sensible, others are out-of-date and some are laughable. We doubt if all the legal archives of the Emerald Isle can better this Irishism from Kansas—"When two trains approach each other at a crossing, they shall both come to a full stop, and neither shall start up until the other has gone." Montana frowns on Wild West films of train hold-ups; perhaps they put ideas into adventurous heads. America's prize fighters must be recruited from Maryland, for in that state it is forbidden to knock freight trains off the track. Iowa, Pennsylvania, and Missouri are all agreed that to kidnap a locomotive is a serious crime, but Idaho makes a curious reservation; there you are specifically forbidden to steal parts of a locomotive. Locomotive men must have a hard time keeping on the right side of the law in Arizona where they must not allow steam to escape so as to obscure the view. In Arizona, too, "any engineer who allows a boiler to burst is a felon."

XUM

Colonel Mount's Annual Report

THE annual report for 1938 of the Chief Inspecting Officer of Railways, Lt.-Colonel A. H. L. Mount—the eleventh to appear over his signature—shows, as was to be expected, a substantial diminution in the number of fatalities to passengers in train accidents, properly so-called, which includes collisions between trains; derailments, accidents due to, and failures of, engines and rolling stock; and collisions with vehicles at crossings. There were 11 passengers killed and 533 injured in such accidents, compared with 49 killed and 1,007 injured in 1937, when the figures were the highest for 23 years, mainly on account of the Battersea Park and Castlecary accidents, which together accounted for 43 passengers killed and 258 injured. The number of railway and contractors' servants killed in train accidents in 1938 was 7, and those injured amounted to 62, compared with 11 and 116 in 1937. The annual averages for the five years 1930-34 were 9 killed and 84 injured under this heading. Casualties in respect of other persons came to 12 killed and 49 injured, of which 11 fatal and 33 non-fatal casualties occurred at level crossings; the remaining fatality and 3 of the cases of injury involved occupants of two aeroplanes which fell on passenger railways without being struck by trains. Total casualties in train accidents were thus 30 killed and 644 injured, compared with the corresponding averages of 25 and 592 respectively for the five year period 1930-34. Total train mileage was 453·1 millions, 2·9 millions less than in 1937 and 36·9 more than the average for the five years 1930-34. Only a relative value can be given to figures of this kind, in any case; the high standard of safety to which we have been long accustomed is in no danger of diminishing. On the contrary, the constant extension of the most up-to-date signalling and operating methods is every day providing still greater protection to those who travel by train. During the last twelve months, as illustrated in these columns, some very important signalling works of the latest description have been opened, not only in large stations but elsewhere, in connection with electrification extensions or to improve facilities on heavily-worked steam-operated lines.

Eleven cases of train accident—if we include a case of a train striking a servant at a crossing gate to which he was attending—were inquired into, and 7 were attended with loss of life. There was only one derailment of a passenger train inquired into—that at Rutherglen, following the breakage of a carriage axle—compared with 7 in 1937, when there were several cases of excessive speed in unfavourable circumstances. In the Oakley junction accident an express overran the junction home signals at danger and was diverted to a branch line, colliding head on with a standing empty carriage train. The signalman had wrongly accepted the express without resetting the facing points for the main line and then found he could not do so, the empty train being just on a track circuit holding the lever. The driver was, however, held partly responsible; it was evident that he had not applied his brakes fully until he realised that the main-line signal was not going to be cleared for him. The distant signals have now been moved to afford a clearer view and the L.M.S.R. is fitting direct admission valves to all new rolling stock for main-line services and to existing stock by degrees. The two accidents on the L.P.T.B. lines in which false clear signal indications were involved receive special comment in the report. The first one, between Waterloo and Charing Cross, Northern Line tube, had fortunately no serious results, attracting no great amount of public attention, although the question of ensuring more efficient and quicker handling of detrainment of passengers from trains held up on tunnel sections, especially where ventilation conditions were not of the best, came somewhat to the fore. The collision arose from the action of a lineman, not fully acquainted with the control circuits—he was posted to the adjacent district only a few days before—who made a temporary connection round the contacts of a relay without realising all the risks and circumstances involved, while there was failure of traffic staff to warn drivers of the conditions ahead.

The serious collision on the District Line between Charing Cross and Temple stations, in which 6 passengers were killed, the first train accident fatal to a passenger on that railway since 1876—a most remarkable record—was the subject of very careful investigation, although its primary cause, a wire connected to a wrong terminal in a circuit closer on a lever in the Charing Cross signal box, switched out at the time of the accident, was discovered immediately. The blunder was made by an installer, a man considered by his chief lineman to be thoroughly reliable, in the course of tidying up connections in a new relay room and the signal box, but a large measure of responsibility was attributed to the chief lineman, whose duty it was to satisfy himself that nothing had been done to impair safety. Traffic had been running for about 4½ hours when some congestion led to the false working of the starting signal at Charing Cross being observed and

Particulars	Annual average, 1920–24		Annual average, 1925–29		Annual average, 1930–34		Year 1937		Year 1938	
Accidents to trains	1,009		941		796		818		717	
Accidents to or failure of rolling stock or permanent way	11,153		9,141		5,772		4,695		3,595	
Casualties—	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*
Passengers	92	2,577	91	3,733	74	4,394	110	6,380	69	5,523
Servants	248	3,518	210	3,267	183	2,592	189	3,043	200	2,690
Other persons	67	136	67	158	51	146	41	129	52	151
Totals	407	6,231	368	7,158	308	7,132	340	9,552	321	8,364
Passenger journeys, excluding free conveyance (millions)	1,848		1,661		1,612		1,819		1,720	
Freight tonnage (millions)	322		320		288		318		285	
Net ton-miles (millions)	17,457		17,562		16,060		18,391		16,679	
Companies' servants employed (March)	707,574		680,197		603,621		601,080		608,719	
Passenger and freight train mileage (millions)	368·7		401·3		416·2		456·0		453·1	
Shunting mileage (millions)	121·4		122·6		112·6		119·3		112·7	
Light engine mileage (millions)	27·8		29·0		26·8		30·4		29·3	
All casualties per million train miles :—										
Killed	1·1		0·9		0·7		0·7		0·7	
Injured	17		18		17		21		18	

reported by motormen who just managed to avoid collisions. Unfortunately these warnings were not promptly comprehended or acted on by the traffic staff, two senior members of which were held responsible for their serious failure to act in accordance with the urgency of the position. The L.P.T.B. has adopted a recommendation that the rules dealing with such circumstances should be amplified to make clear beyond doubt the responsibilities of the staff in such emergencies. As a reminder to the signal staff a check certificate has now been introduced, which has to be signed by every person carrying out any alteration, disconnection, or test involving signal equipment. Violent arcing after the accident led to suggestions that the current should have been switched off immediately, but there were certain objections to this, tunnel lighting not being installed and the trains concerned having no emergency battery lighting. It has been decided to instal tunnel lighting and give instructions for current to be cut off in the event of an accident involving serious damage. Electric tail lamps are also to be provided in addition to the oil ones, while safety glass is being used for windscreens and cross-partitions where not already provided. This accident on a section of line fitted with the most modern signalling apparatus was a very unfortunate occurrence, serving to emphasise how great is the responsibility resting on those who have to maintain the equipment and how imperative it is that any alteration, however slight, shall be thoroughly checked and tested before traffic is allowed to run again. The serious failure of the traffic staff to take action was due perhaps in some measure to inability to realise that such a defect could exist, but that affords no excuse for what happened, and it is hoped that action by those in charge of operation will be sufficiently prompt and decisive in future to prevent any recurrence.

The Motherwell accident on the L.M.S.R., where a locomotive, after one collision, broke from its train and ran away unattended from Wishaw South station, led to a recommendation that the introduction of a distinctive block telegraph bell signal of "*Unattended* vehicles running away" should receive consideration, as this, it was thought, would enable signalmen to take drastic action to deal with such a runaway, which they might hesitate to adopt in the case of a train conveying passengers or having men in charge. Two cases of brake failure when engines were backing on to their trains, at York and Aberdeen, drew attention to the importance of correct maintenance of combination steam and vacuum brake equipment and the need for ensuring that the shed staff shall have their attention directed to the exact nature of any fault and not be led to make mechanical adjustments when the defect comes from a leak. The derailment at Rutherglen, which might easily have had far more serious results than did in fact occur, was caused by an axle breakage due to a fatigue flaw at the edge of a wheel seat, where it is almost impossible to detect one unless wheels are pressed off. To do this at frequent intervals would involve unjustifiable expense; the reported incidence of failure has averaged only 3 per annum for the last 6 years. Nevertheless, further steps are being taken to prevent the initiation of such flaws and to effect other improvements likely to make for greater safety in this matter. A similar breakage, occurring at low speed at Hyde junction, was not made the subject of an inquiry, nor was a derailment at Maryville, after oscillation of a locomotive travelling at 45-50 m.p.h. on ash ballasted track. A speed restriction has been imposed on the type of locomotive in question when working over the branch line concerned.

Referring to the methods available for preventing accidents, the report states that recommendations were made in 9 cases of the train accidents inquired into, were wholly or partly adopted in 7, and were still under consideration in the remaining 2 cases. Many other train accidents were, as usual, satisfactorily dealt with by correspondence. A.T.C. equipment of the warning type with track apparatus fixed at a suitable distance on the approach side of the distant signals would, in all probability, the report observes, have had preventive effect in the Oakley accident. Control in one form or another might also have prevented, or mitigated, the effects of 34 cases of train accident (excluding certain accidents at level crossings) into which inquiries were not held and in which 16 persons were injured. In accordance with a recommendation in Colonel Mount's report on the Castlecary accident, the L.N.E.R. is now installing experimentally a system of warning A.T.C. on a section of its main line. There were 57 buffer-stop collisions involving injury to 106 persons, mostly shock effects, compared with 69 cases and 207 injuries in 1937. The calling-on arm was reported as being involved in 23 train accidents, 7 fewer than in 1937. Accidents to trains of every kind, reported in 1938, totalled 717, or 101 fewer than in 1937; the averages for the last three 5-year periods ending with 1934 have been 1,009, 941, and 796 respectively. Accidents to, or failure of, rolling stock and permanent way totalled 3,595, compared with 4,695 in 1937. Failures of coupling apparatus were 2,718 with goods and 569 with passenger trains, again showing a marked improvement over the previous year, which had 4,401 in all; the chief liability to failure is still found in weakness of drawgear, which accounts for over 90 per cent. of all cases. Twenty-three cases involved collision, derailment, and/or personal injury, all but one with goods trains.

The report shows that there were 44 persons killed and 43 injured at level crossings by train and movement accidents. There are some 4,560 public road crossings over principal lines, of which all but 200 have gates and are attended. Out of the 25 cases of accident involving casualty—there were 23 in 1937—17 were due to lack of caution on the part of pedestrians or road vehicle drivers. Gatemen failed to obey the rules in 5 cases, trainmen were at fault in 1, signalmen in 1, and station staff in another. In 12 accidents resulting from trains running into obstructions after road vehicles had collided with gates, 2 occupants of road vehicles were killed and 8 injured. Such cases are not generally reported unless a casualty or train accident results. Casualties at occupation and footpath crossings were 28 killed and 15 injured, compared with 25 killed and 12 injured during 1937. An inquiry was held into the accident at the North Hendre crossing, when a rail-motor train ran down a motor cyclist and there were no witnesses. There had been, despite certain measures, much careless and irregular user of the crossing by cyclists, and further important recommendations are under consideration. Colonel Mount observes that "the risk of accident at the 4,360 public (gated) crossings is negligible compared with the other risks of the road, and users have every justification for expecting a safe passage when the gates are open for the road. Action is constantly being taken to improve protection where necessary, and attention should continue to be given to the shifting of signals further back from the gates, in view of the increasing speed of trains, and of the fact that the gates are across the railway more often and for longer periods than in the past. Highway authorities should also continue to provide adequately for warning road users by means of notices on road approaches, and wider use of the traffic light might well be made at heavily used crossings, with a view to improvement in traffic facilities." Although there is no specific responsibility resting on railway companies by legislation to safeguard road movements at occu-

pation crossings, nevertheless, the report observes, they have carried out " a valuable investigation " in which some 22,650 such crossings have been categorised, the recommendations submitted receiving attention. The chief risks, no doubt, come from the increasing employment of motor lorries by users of such crossings, creating grave danger for trains should one be stopped for any reason on a crossing, or be driven carelessly across as a train is coming.

On accidents other than train accidents we find 438 inquiries were held in 1938, leading to 187 recommendations being made, of which 139 were adopted, 34 not adopted, and 14 are still under consideration. In movement accidents there were 58 passengers killed and 4,990 injured; no fewer than 1,471 cases (8 fatal, and it is wonderful the figure is not much higher, in view of the foolish acts that can be witnessed daily) were due to entering or leaving trains in motion, while 2,636 were caused by the opening and closing of doors. Nearly all these cases were due to carelessness. The door accidents were fewer last year, after a rise for some time. There was an increase from 178 to 193 of fatalities to servants in movement accidents, but fewer injuries, 2,628 against 2,927 in 1937. Of the 193 fatalities, 149 were due to want of caution on the part of the deceased or another servant, or breach of rules, and 43 were caused by misadventure or were purely accidental. Defective systems of working, apparatus, &c., or want of proper rules or appliances, accounted for one death. Colonel Mount devotes considerable space to accidents to men working on the line through being struck by engines and trains, which amounted to 75, involving 82 casualties, an increase of 10 and 13 respectively over 1937. The last-named, however, happened to be an exceptionally good year, and 1938 compares favourably with the 1930-1934 averages. Here again we find that most of the casualties (47) were caused by want of care on someone's part. Inadequate protection caused 18 casualties and the lookout man's fault led to 4; 8 were due to failure to act on a warning. There are two main causes, the report observes, leading to inadequate protection. " The man in charge may be influenced," it says, " by past practice and fails to weigh up conditions as he finds them, or the erroneous idea may exist that work can be safely undertaken without protection because it is of short duration." Examples are given of each type of accident, with appropriate comment, showing how quite a small misconception may lead to danger passing unnoticed until it is too late.

The worst feature of the year, the report says, was the rise in casualties caused by want of individual care, or lack of care on the part of others, the total (47) being materially higher than the figure of 27 for the 1930-1934 period. Most of them occurred when no lookout man was in attendance and may be classified as: (*a*) Those in which the individual concerned knew that a train was approaching but acted incorrectly; (*b*) Those in which he was taken unawares. Nearly all the accidents under (*a*) would have been prevented by strict attention to Rule 234(*a*), stipulating that men must move clear of all lines, if space between is less than 8 ft., unless they can distinctly see that they are in a position of safety. " It is regrettable to find," observes Colonel Mount, " that it is not always adhered to by those whose lives may depend upon it. All concerned should concentrate on propaganda in this respect, stressing specially the questions of traffic density and increased speed. Disciplinary action may even be necessary to ensure obedience by everyone to the rule. I also suggest that consideration be given to the practicability of making absence of accident the subject of some form of competitive reward in each permanent way inspector's district." After citing some accidents he goes on, " The foregoing illustrations show how necessary it is for men in this calling to train themselves always to be on the alert; it is impossible to guard against every contingency and, unfortunately, in spite of considerable effort to bring to notice the prevalent dangers and the ways to avoid them, accidents due to individual carelessness seem to be increasing. The practice of holding an inquiry in every instance where a man working on the line is struck by an engine or train is still being pursued, and I am glad to report that the resulting recommendations continue to be adopted readily by the railway companies. But I remain of the opinion that, besides action on the lines already mentioned, more might well be done by way of personal instruction and by giving greater publicity to the circumstances which lead up to specific accidents, with a view to providing an effective warning to the whole of the staff in this employment." The report then gives instances of " unaccountable carelessness " among cases of men struck while walking or standing on the line on duty, or proceeding to or from work, in one of which 5 were killed by the only train that ran over the line in the 24 hours. Stricter compliance with rules governing action during shunting operations is also emphasised as essential.

The last line-side mail pouch accident was in January, 1938, and mentioned in Colonel Mount's report for 1937; the postal authorities have made their equipment more conspicuous by fixing enamelled plates thereto, illuminated by night when the apparatus is in use. Many other details of the report deal with non-movement accidents of various kinds, the vast majority of which are industrial casualties of a more or less non-preventable character, including a curious case of escape of chlorine gas from a cylinder and a fall of rock in a tunnel. Attention is still being directed to providing better fencing at certain localities where trespass is likely on electrified lines. We reproduce the usual table of casualties arising from *all movement on rail*, excluding trespassers and suicides, with the customary comparative columns. The report concludes by again stressing the " casualties which so grievously attended the presence of men on the line " and recapitulating the methods recommended to improve this regrettable position. We ourselves on more than one occasion of recent years have suggested that the subject might well form one of those to be considered at the next International Railway Congress.

* * * *

Bombay, Baroda & Central India Railway Company

A DECREASE in gross earnings was more than offset by a saving in expenditure in the year ended March 31, 1939, so that net earnings were higher than those of the previous year. There has been no change in the mileage operated by the company. The combined system, apart from the 522¾ miles worked for Indian States and other companies, consists of 1,035¼ miles broad gauge, 1,879 miles metre gauge, and 72¼ miles 2 ft. 6 in. gauge worked by the company for the Government of India. Gross earnings of the combined system for the year under review amounted to Rs. 11,88,56,022, showing a net decrease of Rs. 8,54,086, made up of a gain of Rs. 1,66,454 on the broad gauge, against a fall of Rs. 10,20,540 on the metre gauge. In the expenditure of Rs. 6,43,32,875 there was a reduction of Rs. 12,81,277, so that the net earnings of Rs. 5,45,23,147 were higher by Rs. 4,27,191. The company's share of surplus profits, after deducting Indian income tax and super tax, is Rs. 8,81,172, compared with Rs. 8,81,512 for the previous year, and has produced £65,612 in sterling. Stockholders receive 6 per cent. (including 3 per cent. guaranteed interest) for the year under review, the same as for the last eighteen years.

Passenger receipts were higher on both gauges but the improvement of Rs. 4,62,710 was almost entirely in season and zone tickets. Revenue from parcels and other coaching items was, however, lower by Rs. 2,50,787. General merchandise traffic on the broad gauge gave an increase of 56,938 tons and Rs. 2,07,094 while on the metre gauge with a decrease of 11,793 tons the receipts were lower by Rs. 10,33,775. The principal decrease was Rs. 21,98,813 in food grains other than wheat, but raw cotton receipts were up Rs. 10,07,684. Maintenance of structural works cost Rs. 8,82,003 less, mainly under replacements and renewals owing to short receipt of permanent way materials. In maintenance and supply of locomotive power the increase of Rs. 3,70,817 was caused partly by more workshop repairs to engines, and higher rates for coal and increased consumption because of increased train-mileage. To carriage and wagon stock maintenance the amount charged was Rs. 11,28,564 less, partly because the cost of repairs and wages of staff and stores for the coaches of the Bombay local electric service were booked under Abstract H (Expenses of Electrical Department) in accordance with the revised revenue classification introduced from April 1, 1938. Expenses under Abstract H were Rs. 10,53,286 higher. Capital expenditure charged off during the year under review amounted to Rs. 14,51,860. Some operating results of the combined system are compared in the accompanying table:—

	1937–38	1938–39
Passengers, number	57,762,032	57,684,181
Passenger receipts, Rs.	3,77,55,723	3,82,18,433
Tons carried	9,551,887	9,402,171
Average ton-mile receipt, pies ..	7·67	8·14
Goods receipts, Rs.	7,28,73,801	7,16,94,615
Gross train-mile earnings, Rs. ..	6·89	6·74
Net train-mile earnings, Rs. ..	3·11	3·09
Train-miles	17,370,488	17,621,390
Operating ratio, per cent.	54·81	54·13

PUBLICATIONS RECEIVED

The Locomotive Running Department. By John G. B. Sams. London: The Locomotive Publishing Co. Ltd., 3, Amen Corner, E.C.4. 8¾ in. × 5¾ in. 104 pp. Illustrated. Price 3s. 6d. net.—The efficiency of running shed routine and the careful planning of engine and enginemen's rosters in order to obtain the maximum of useful work from the capital invested is an increasingly important factor in economical railway working. Running shed foremen and others concerned with, or interested in, locomotive depot work will find much food for thought in the excellent description here given of the work of a locomotive running department. The author speaks from a wide practical experience, having held a number of important positions in railway locomotive departments, including Assistant Divisional Superintendent of Operation, Great Eastern Railway; Locomotive Assistant, Jamaica Government Railway; and Locomotive Superintendent, Kenya & Uganda Railways & Harbours. After a foreword by Sir Godfrey Rhodes, General Manager of the Kenya & Uganda Railways & Harbours, the author deals with general depot layout and equipment; the planning of engine workings; storekeeping; engine failures and routine examinations; and breakdowns and features of operation, including "wrong line" and single line working. The treatment touches on both home and overseas practice and includes half-tone and line illustrations, tables and reproductions from forms.

The Travellers' Guide to South India. Published by the Chief Commercial Superintendent of the South Indian Railway, Trichinopoly. Profusely illustrated, and with a number of striking colour plates. 137 pp. 9 in. × 7 in.—A few historical and geographical remarks upon southern India and a hint or two to western visitors form the introduction to the guide proper. This deals with all places of note and embraces temples, *melas* (religious fairs), industries, education, and sport. The closing pages are devoted to tabulated information to traders, arranged commodity by commodity and showing the quantities railed during the year ended March 31, 1938. Rice and paddy head the totals with over 750,000 tons, followed by groundnuts with over 200,000, salt with over 150,000, and timber and tiles each with over 100,000 tons. A good map of the South Indian Railway system is also included. The whole guide is artistically produced.

Compagnie Internationale des Wagons-Lits et des Grands Express Europeens Guide: May 15, 1939. London: The International Sleeping Car & Express Trains Company, 40, Stratton Street, W.1; Paris: 40, Rue de l'Arcade; Brussels: 53, Boulevard Clovis. 9¼ in. × 8¼ in. 308 pp.—Many travellers from Great Britain to Germany are familiar with the timetables issued by the Mitropa Company and for their convenient size and comprehensiveness prefer these books to the far more bulky official guides. Not so many travellers, however, are aware that the International Sleeping Car Company publishes a similar timetable of exactly the same size. But whereas the *Mitropa Kursbuch* is concerned chiefly with the train services in Germany, the Wagons-Lits book covers all the dining and sleeping car services operated by the latter company in Europe, Western Asia, and Africa, and a study of the handbook is a revelation of the vast scope of these operations. The limitation of the Wagons-Lits guide is that it shows only those trains on which its own cars are run (whereas the Mitropa book gives a fairly complete survey of all main and branch services), but as travellers to and from Great Britain, in the great majority of cases, use only one or other of the trains so equipped, for their long-distance travelling, the Wagons-Lits book is fully up to ordinary requirements. As an example of the clarity that should characterise a timetable, we have rarely seen anything to equal and certainly nothing to beat this book. First to be tabulated are the principal *trains-de-luxe* or "Grands Express Europeens," with very complete information as to the through sleeping car workings; then come the dining and sleeping car services of every country in French alphabetical order—Africa (Morocco, Algeria, Tunisia, Congo-Belge, Angola), Germany (through services, also Bohemia and Moravia), Belgium, Bulgaria, Denmark, Egypt and Palestine, Spain, Finland, France, Greece, Holland, Hungary, Italy, Baltic countries (Estonia, Latvia, Lithuania), Poland, Portugal, Roumania, Slovakia, Switzerland, Turkey, and Jugoslavia. The precise working of every car is clearly shown, together with detailed sleeping car and restaurant car tariffs. Diagrams of the various types of sleeping car are given, so that the potential traveller is fully informed of the kind of accommodation available on any particular service. The book is a mine of geographical information, even apart from its value as a timetable.

Materials for Overhead Power Lines.—British Insulated Cables Limited has brought out an attractively-designed catalogue giving particulars of a selected range of materials used in the construction of overhead power lines from low-voltage distribution to extra high-voltage transmission. Much technical information about the design of pole lines, pole foundations, sags and tensions, wind loading, and other pertinent subjects is also included in its one hundred pages.

Guide to A.R.P. Auxiliary Lighting.—The various methods of providing independent lighting for A.R.P. shelters, first-aid posts, report centres, trenches, and so on, are covered in this 16-page illustrated booklet issued "in the interests of civil defence" by Nife Batteries Limited, of Hunt End Works, Redditch, Worcestershire. Information is given on the method of calculating the illumination required for a specified area, the selection of voltage, wiring, number of cells to employ, and recharging. Prices are given. Copies of the booklet are obtainable free of charge from Nife Batteries Limited.

THE SCRAP HEAP

FDO

At first blush the caption, " Fine day only trains," culled from an evening journal, made us sit up with a jerk and we pictured the wretched time-table tyro, already worn to a shadow by the existing plethora of TTHSO's and MWFX's, being confronted with FDO. Then we learned that London Transport proposed, in all earnestness, to double the quantity of trains over a certain section on fine Sundays.

* * *

The late Dwight Morrow, who was very absent-minded, was once reading earnestly on a train when the conductor asked for his ticket. Frantically Mr. Morrow searched for it.

" Never mind, Mr. Morrow," the conductor said. " When you find it, mail it to the company. I'm certain you have it."

" I know I have it," exploded Mr. Morrow. " But what I want to know is where in the world am I going? "—*From " The Reader's Digest."*

* * *

THE L.M.S.R. TIMETABLE

With its May issue the L.M.S.R. main-line timetable appeared with some new ideas designed to assist staff and passengers in finding their way about this bulky sixpennyworth. Table in place of page numbering has been adopted for all reference purposes as seen in the headings reproduced, and these numbers remain unaffected by expansion or contraction of the book at different seasons of the year. It is easier to memorise that the Western Division main line from Carlisle to Crewe is always Table 61, and similarly for all stations comprised in that section, than to recall a multitude of page numbers that may alter during the year. All index references are now to these table numbers instead of pages, and in this process of reconstruction the index has undergone a weeding-out process that keeps it of manageable size and free from references which may be misleading to those not well versed in railway geography. A greater number of stations now has references to tables showing the connections with other districts, the principle having been extended to nearly all stations appearing in four or more tables. Where possible, seekers for journeys extending over several tables are referred to a summary table; otherwise the first reference is to the table covering the initial stage of the journey, and only if more detailed information or later stages are required is it necessary to consult the index column of " Other Table Numbers." Where a town has two or more stations, these are grouped under a composite heading.

* * *

November 1 next will be the diamond jubilee of the introduction of the first railway dining car, which was placed in service on the Great Northern Railway between London and Leeds in 1879. British railways now own 680 restaurant cars and 93 buffet cars; the latter vehicles, made popular by the former Great Central Railway, are used where the demand is insufficient to justify the provision of a full restaurant car service.

* * *

BEES ABOARD A WARSHIP

H.M.S. *Newcastle* had to call in the police recently. The cruiser was at anchor in Portland Harbour when she sent out an S O S. A swarm of bees was in possession of one of the ship's boats on the davits. Constable Walker got the message and he went in search of Ganger Hawkins, of the G.W.R. Mr. Hawkins is one of Portland's bee-keepers, and, collecting skips, he put off in a boat to the rescue. Before long the bees were all comfortably housed and on the way back to shore.

* * *

A RAILWAY CARRIAGE CHURCH

Discarded railway carriages have been put to many different uses, but seldom, we imagine—in this country at any rate—to such ecclesiastical uses as one at the village of Dunton-cum-Doughton, near Fakenham, in Norfolk, where the local Methodists have established their cause in the body of what appears to have been a Midland & Great Northern four-wheeled or six-wheeled vehicle. From twenty to thirty people can gather inside this modest edifice, and the roof has been raised in order to provide a more airy interior.

* * *

CAUTIONARY TALES FOR RAILWAY TRAVELLERS

Tale of Edward Storr

(Who leaned against the door of a railway carriage and thereby caused considerable inconvenience)

The great defect of Edward Storr
Was leaning on the carriage door;
A practice calculated to
Result in grave misfortune, through
The chance unfastening of the latch
In absence of a safety-catch.

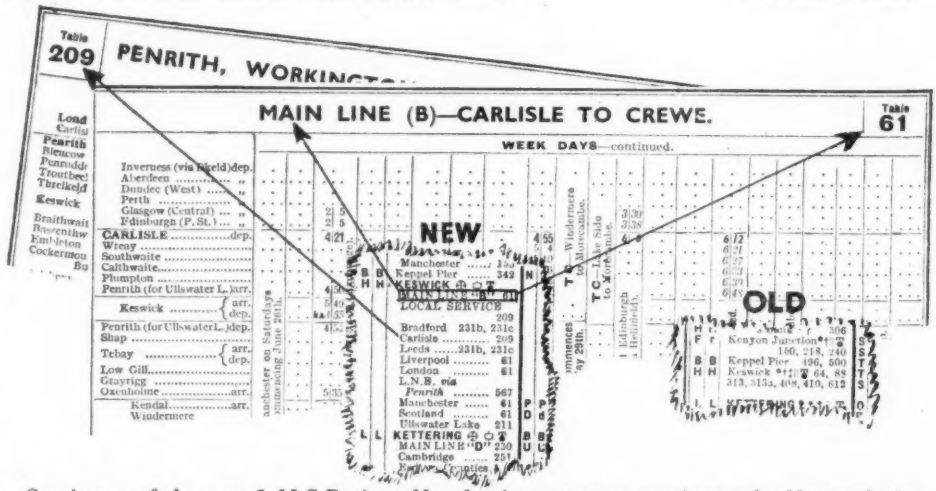
His fond Mamma said: " Edward, dear,
Really, I very greatly fear
You'll tumble, some unlucky day,
And fall upon the perm'nent way."
His father, with an angry frown,
Said: " Come sir! Now, sit down!
Sit down! "

But Edward Storr said: " What a bore!
I like to lean against the door,
Because— " Then came a sudden creak,
And ere his Pa or Ma could speak
The door flew wide, and with a shout,
Their darling child went shooting out.

The swinging door went smashing through
A granite overbridge or two,
Then fell beneath the carriage wheel
With splint'ring wood and twisted steel
Whereby two coaches and a van
Ran off the line, and killed a man!

The windows broke, the ballast flew,
The chef upset the Irish Stew;
And of the people on that train
Quite five were never seen again;
While Edward, landed on the track,
Sustained contusions to his back.

C. HAMILTON ELLIS



Specimens of the new L.M.S.R timetable, showing greater convenience of table numbering over old system of page numbering

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

UNITED STATES

Modern Locomotives and Stock at World's Fair

American and foreign railways between them are exhibiting at the New York World's Fair some 50 vehicles—7 locomotives, 24 coaching and 19 freight cars—as representing their latest practice. These are on view and arranged as follow, track by track :—

Track No. 1

London Midland & Scottish Railway, Coronation Scot (locomotive and 8 coaches) ; and New York Central Railroad, mail car.

Track No. 2

Italian State Railways : Three-car electric express train ; two-car electric local train ; petrol railcar ; and road-rail transport truck.

Track No. 3

N.Y.C.RR., 4-6-4 locomotive class " J3a " ; Norfolk & Western Railroad, articulated passenger locomotive ; General American Transportation Corporation, all-welded box car ; G.A.T.C. 10,000-gal. tank car ; Erie Railroad, motor-car truck with loading racks ; N. & W. RR., 55-ton hopper car ; and Delaware & Hudson Railroad, all-welded hopper car.

Track No. 4

Pennsylvania Railroad, 4-8-2 type " Mla " class locomotive ; Delaware-Lackawanna & Western Railroad, 70-ton cement car ; D.L. & W. RR., refrigerator car ; Bangor & Aroostook Railroad, box car ; Nickel Plate, box car ; Chesapeake & Ohio Railway, gondola ; and Lehigh Valley Railroad, caboose.

Track No. 5

Pennsylvania Railroad ; electric locomotive, class " GG1 " ; stock car ; hopper car ; well-wagon ; and two flat cars.

Track No. 6

Baltimore & Ohio Railroad : 4-4-4-4 type passenger locomotive, *George H. Emerson* ; covered-wagon box car ; cement car ; and caboose.

Track A

Pullman Company : Light-weight room observation sleeping car ; light-weight roomette sleeping car ; light-weight duplex bedroom car ; standard section room sleeping car ; and tourist section sleeping car.

Track B

P. RR., horse express car ; and New Haven RR., coach.

Track C

P. RR., coach ; and N.Y.C. RR., diner-lounge car.

Accelerated Expresses

In view of the demands made on the accommodation of the Denver Zephyr and City of Denver streamline diesel trains between Chicago and Denver, the railways concerned have duplicated the service, but on slightly slower times and with steam haulage. The Burlington Company has put on a new train, called the Overnite Denverite, booked to cover the 1,033·5 miles in 17 hr. 20 min., inclusive of nine intermediate stops, or 17 hr. 5 min. actual running time; the fastest point-to-point run is Chicago to Galesburg, 162·4 miles, in 140 min., at 69·6 m.p.h. The Chicago and North Western and Union Pacific Railways have jointly accelerated their Columbine service (which two years ago made many intermediate stops and took 32¼ hr. for the journey) to the same overall time, and as their route is 1,049·1 miles, and the same number of stops are made, even faster running is needed. The C. & N.W. covers the 485·5 miles from Chicago to Council Bluffs (Omaha) in a running time of 465 min., with three stops, and the U.P. runs the 513·6 miles from Omaha to La Salle in 471 min., also with three intermediate stops, the fastest point-to-point booking being from Grand Island to North Platte, 137·2 miles in 123 min., at 66·9 m.p.h. Editorial comment appears on page 82.

In the reverse direction a time of 19 hr. 20 min. has been fixed for the competing trains, and has been obtained by accelerating the Burlington's Aristocrat, and the eastbound Columbine of the U.P. and C. & N.W. Another entirely new service has been established by the Burlington between Chicago and Denver called the Exposition Flyer, but this makes more numerous stops and is not so fast. Elsewhere the Santa Fe has put on a new Valley Flyer, running the 313 miles between Oakland (San Francisco) and Bakersfield in 6 hr. 5 min. each way, and connecting at Bakersfield with Los Angeles by motorcoaches. The Kansas City Southern, over a route with many stops and no previous speed tradition, has a new diesel service over the 560 miles between Kansas City and Shreveport (Louisiana) in 12 hr. 10 min. southbound and 12 hr. 40 min. northbound; the Missouri Pacific has established a time of 5 hr. 5 min. for the 279·2 miles between Kansas City and St. Louis. The Grand Canyon Limited of the Santa Fe has been accelerated by 55 min., and the Pacific Limited of the C. & N.W. and U.P. and the Golden State Limited of the Rock Island by 60 min. each.

RHODESIA

Workshop Developments and Progress System

An extensive scheme of modernisation and enlargement of the mechanical workshops at Umtali has recently been authorised. This includes the erection of a new boiler shop, a new wagon shop, and a new welders' and metallers' shop; when completed, all repairs to the 13th, 14th, and 16th class Garratt locomotives, together with the 7th class shunting engines, will be concentrated at Umtali.

At Bulawayo workshops, which will normally handle the repair of 9th, 11th, and 12th class engines, the progressive system of locomotive repairs has recently been inaugurated under the direction of the Chief Mechanical Engineer, Major Sells. Prior to the introduction of this system there were on an average eleven locomotives undergoing major repairs at any one time, resulting in some waiting unduly long for various parts, while in order to keep the staff occupied, work was begun on other engines which in their turn were delayed awaiting new component parts. To overcome these difficulties, which resulted in more engines than necessary being out of traffic, the progressive system was introduced, aiming at the following objects: (i) reduction of time locomotives are in shops (ii) prevention of delay awaiting material by arranging the various operations to a time schedule based on actual experience, and (iii) reduction of repair-cost per engine. Work on the first engine dealt with under the new system was begun in November, and by the end of 1938 the new scheme was in full operation.

A comparison of the output of repaired engines for the three months January to March, 1939, with the same months in 1938 shows :—

Class of Repair	1938	1939
General	11	10
Wheel job	2	7
	13	17

During the 1938 period there was an average of 11 engines in shops at a time, but in 1939 the average was seven, thus four more engines were available for traffic. The average working days per engine in the 1938 period was 73·27 as against 51·7 in 1939, which is the lowest on record, but which included three engines which had entered shops before progressing began and were in for 92, 89 and 68 working days respectively. The average time in shops for the seven " progressed " locomotives was only 38·3 working days.

Floods and Washaways

The abnormally heavy rainfall experienced in Southern Rhodesia and Moçambique Territory during the past wet season resulted in several interruptions to traffic. The first occurred on February 27, when a landslide of some 200 tons of soil and boulders slipped on to the track in a cutting on a curve between Macequece and Umtali, on the Beira—Rhodesia main line. This caused the derailment of a Garratt engine, hauling a mixed train from Beira, but without resulting in any injuries to passengers or train crew. A deviation was constructed along an abandoned formation and through running was restored on the evening of February 28.

Torrential rains fell during the night of March 2-3 along the route of the Beira Railway, several points recording more than 10 in. in 24 hr. This heavy rain coincided with the high spring tides at Beira, and the Pungwe Flats were entirely under water for over ten miles alongside the railway, which crosses this area on a series of embankments and viaducts with a bridge over the normal course of the Pungwe River. These flood protection works were constructed after the serious washaways in 1926, and this year's floods have been a major test—and a satisfactory one—despite the track being covered by water at several points. No actual

interruption to the train service was caused, but in the interests of safety the running of trains across the Flats was confined to daylight working during the flood period. A feature of the flooded area was the large number of buck taking refuge on the railway embankments; many of the animals were killed by the local native inhabitants.

The Beira—Rhodesia line was again breached on the night of March 6-7, when the Munene River just west of Macequece overflowed its bank and washed away the embankment on both sides of the railway bridge, which was at one time under water. Through working was suspended until March 9, passengers being transhipped across the affected area.

Salisbury Area Washaways

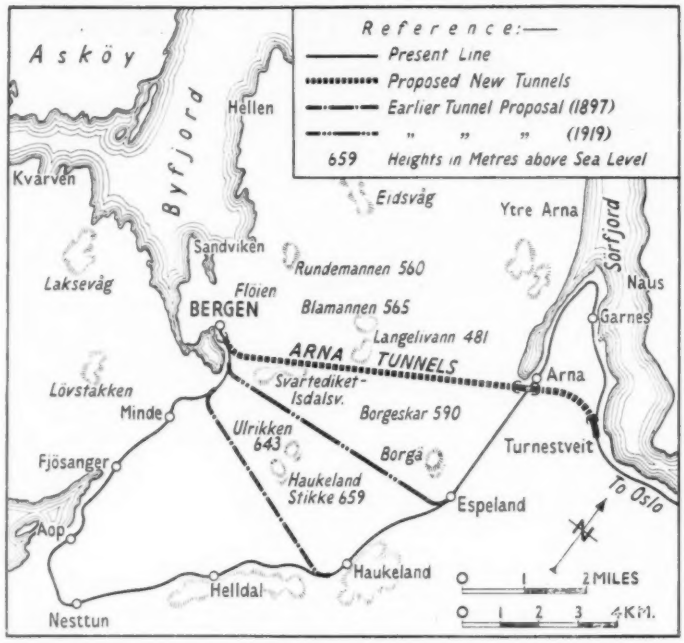
On the night of March 15-16 abnormal rains in the Salisbury District caused rivers and streams to become raging torrents overflowing their banks, and resulted in washaways at Ruwa on the Umtali side of Salisbury and at the Hunyani River bridge on the Bulawayo side of the city. Of these, the Hunyani washaway was the more serious as the line was under water for 1,000 yd., and the river running 5 ft. over the rails on the bridge. Passenger trains were held up and as the roads were impassable passengers could not be brought into Salisbury by car as at Ruwa. Transhipment was possible on the morning of March 17, when the river subsided, but normal train working was not restored until March 20.

Apart from the main line, serious interruptions to rail traffic occurred on the Salisbury—Shamva branch, the soft state of the formation holding up normal working for several days, though a railcar service was maintained. On the Fort Victoria branch the approaches of a bridge at 121½ miles were washed out and the bridge itself shifted about 18 in. during a severe storm on February 27. Repairs were effected on March 6, but the river again came down in flood, and it was not until March 15 that through running could be resumed.

NORWAY

Proposed Short Cut to Bergen

According to *Meddelelser fra Norges Statsbaner*, the official organ of the Norwegian State Railways, the former District Manager, Herr Esmark, has, at the request of the management, worked out a scheme for an entirely new alignment for the western part of the Oslo—Bergen line, between km. posts 459 and 491·5. The proposal is to divert the line from Turnestveit *via* Arna to Bergen through two long tunnels, shortening the distance by 22 km. (13·67 miles) and eliminating a steep grade and many sharp curves, thus effecting considerable savings in operating costs and running time. Many other proposals with this object have already been advanced, some dating as far back as 1897, but the present one



Sketch map showing the latest and earlier proposed chord lines giving direct access to Bergen

is more effective than any of them. It involves a 7·5-km. (4·66-mile) tunnel, beginning a few hundred yards outside Bergen, to Arna, and, after passing through the Arna valley, another tunnel 2 km. (1·23 miles) long to Sörfjord near Turnestveit.

Herr Esmark put this idea forward in 1919 but circumstances have changed considerably since that time, lending additional force to the scheme. Tramway and motor lorry competition alongside the Bergen—Nesttun section has so affected the traffic that it no longer seems necessary to run the line through Nesttun at all. Traffic receipts fell some 38 per cent. between 1921 and 1936; season tickets especially declining; fast goods and parcel traffic has all but disappeared. The State Railways consider that this traffic should be left entirely to road motor services. The new route would, however, shorten passenger train time by 40 to 45 min. and goods train time by 110 min. It is proposed to spread the construction over a period of six or seven years. The estimated outlay is Kr. 7,200,000, but as the annual operating savings are put at Kr. 290,000, there is financial justification for the undertaking.

FRANCE

First Year of National Railways

M. Guinand, President of the French National Railways Company (S.N.C.F.), in an address to the shareholders at the annual meeting on June 29, reviewed the results of the first year's working of the company, which took over the railway systems from the former private companies on January 1, 1938. The transfer of the railways, he said, had been arranged so quietly that the public was unaware of the profound changes effected by the company in order to ease the financial burden imposed upon the country by the current railway deficit. With reference to the financial situation, M. Guinand said that in 1938 the operating receipts amounted to fr.15,565,000,000 and the operating expenses to fr.17,535,000,000 leaving an operating deficit of fr.1,970,000,000. For 1938 the deficit represented 12·66 per cent. of the receipts, whereas the deficit in 1937 was 15·86 per cent. of the receipts. He maintained that if the franc had not undergone another devaluation in 1938 the deficit would have been substantially less in absolute value than the 1937 deficit, which was fr.2,038,000,000. Further, continued M. Guinand, the company had to meet the combined effect in 1938 of a rise in wages and prices together with a fall in traffic of 17 per cent., compared with the previous year. The company was also obliged to raise its tariffs, before the co-ordination was completed and thus encountered keen competition from other forms of transport. If it had not carried out its programme of economies and reorganisation the railway deficit for 1938 would have been much larger. The outlook this year was more encouraging. Traffic was increasing slightly though still below the 1937 level. With a current reduction of 13 per cent. in operating expenses the deficit this year would be less than 5 per cent., while if there was no further fall in trade, it would disappear in 1940.

Great savings had been effected by the amalgamation of the railways,

said M. Guinand, due to the unification of the management, methods, and material. Much progress had been made in selecting equipment best adapted for each kind of traffic. Standardised types were adopted, and standardised methods applied in the workshops, thus reducing cost prices. The same principles were applied to the maintenance of the permanent way and the rolling stock. In operating methods, local centres had been eliminated and unimportant shunting yards closed. The most economical and speediest routes were selected both for passengers and goods. Means had been taken to reduce or eliminate movements of empty trains, and a central office had been formed to obtain the most efficient use of rolling stock. Unification of regulations had effected economies and this would be followed by unified signalling. Great efforts had been made to maintain traffic in commercial competition with other means of transport. These included door-to-door delivery, the use of containers, and special tariffs for transport of loaded road lorries.

DENMARK

Traffic Committee Conclusions

As earlier mentioned in THE RAILWAY GAZETTE, a traffic committee representing all forms of land transport was appointed in 1937, to work out a complete traffic plan for the whole country. It proved, however, impossible to come to any agreement in this respect, and therefore the committee concentrated on a few questions, one being a new law regulating the road traffic (buses and carriers exclusively), and another the economic position of the different railways. The committee has now finished its investigations and is writing its report.

Private Railways Recommendations

A decision regarding the private railways divides them into four groups, the first three comprising those still of some importance, either to the country in general or locally; lines in the second and third groups need financial help. The fourth group comprises 18 private systems for which financial help, although urgently needed, is not recommended, and there is no doubt, that many of them—aggregating some 652·1 km. (411·5 miles) of line—will be closed within the next few years; a few, however, may receive the necessary financial help from the rural councils concerned. As the total length of the private lines in Denmark is 2,610 km. (1,622 miles), probably one-fourth will be closed before long. In the fourth group is included the Copenhagen-Slangerup Railway, which carries a considerable suburban and excursion traffic to and from Copenhagen, and its receipts are nearly sufficient to cover the expenses. But capital is needed for modernisation—electrification is contemplated—and in the opinion of the committee this modernisation must be a task for the city of Copenhagen and the suburbs.

State Railways Secondary Lines

Concerning the State Railways, the committee has confined itself to the economic investigation of seven of the secondary lines. It recommends that the Dalmose—Skelshør (11·5 km.), Skern—Videbæk (19·5 km.), and Assens—Tommerup (29·2 km.) lines shall be closed to passenger traffic, but goods traffic shall experimentally be carried on. The committee also recommends that the Løgstør—Hobro line with its Aalestrup—Viborg branch (103·8 km. in all) should be closed to passenger traffic, but that goods traffic on part of the line should be continued.

The Skive—Glyngøre line (28·7 km.) with the Glyngøre—Nykøbing train ferry should not be closed for the present. The train ferry will, it is expected, in a few years be replaced with a road bridge with a railway track on the roadway, to enable trains to proceed from Glyngøre to Nykobing at low speed. The future of this railway therefore depends upon the building of the bridge and its effect on traffic.

It is recommended that the Viborg—Herning (47·8 km.) and Laurbjerg—Silkeborg—Funder—Bramminge (142·9 km.) lines should remain as they are, but it is left to the State Railways to watch the traffic on them and later decide whether they shall be closed or not.

All the secondary State lines mentioned above are at present working at a loss, which it is not found possible to eliminate, and some of them need modernisation and track renewal.

Centralisation of Less-than-wagonload Traffic in Copenhagen

In August, 1937, the Danish State Railways appointed a committee to investigate the question of centralising all less-than-wagonload traffic to and from the different stations in Copenhagen, and the report has now been published. At present such goods can be sent to or from any of the stations, Copenhagen, Frederiksberg, Nørrebro, Østerport, Hellerup, and Vanløse. The committee finds that this traffic (except express goods) can suitably be concentrated at Copenhagen Central goods station, with considerable advantage to the customers, and no balancing disadvantages. Goods may in future, as at present, be sent to or from any of the said stations, but the transport from or to Copenhagen Central will be by State Railway lorries. It is calculated that the cost of lorries and garages will be about Kr. 165,000, and that the working of the lorries and the increased shunting and warehouse work at the Central station will amount to Kr. 277,500 a year, whereas the yearly savings in shunting and warehouse work at the other stations will amount to Kr. 322,500, making a total saving of Kr. 55,000 a year, less interest on the Kr. 165,000 outlay.

There will also be a saving of wagon-miles, and the number of wagons crossing the Great Belt by train ferry is likely to be reduced by 16 a day, thus giving sufficient space on the existing ferries for 24 additional motorcars. Moreover there will be a further saving of 75 goods wagons a day and a reduction of about 50 train-km. (31 train-miles) a day, and in addition, this centralisation will enable some passenger trains in the Copenhagen suburban traffic to be relieved of a delaying parcels traffic.

It will not be necessary to alter the track arrangements at Copenhagen Central, and the warehouses there are of sufficient size to take the increased amount of goods. The number of wagons with less-than-wagonload traffic entering and leaving the Central station is at present 184 daily, and this figure will rise to 263 when the new arrangement comes into force. The final recommendation is that this new arrangement should be introduced in two stages, each beginning at a timetable change. The first stage will involve all goods to and from Zealand and Lolland-Falster, and the second stage goods from or to Jutland and Funen.

SPAIN

Corunna-Zamora Railway

The new railway station at Corunna, with the first kilometre of track, was inaugurated on June 22 by General Franco in person. This is the northern terminus of the railway now under construction between Corunna, Santiago, and Zamora.

New Railway Legislation

The Railway Junta, or board, constituted under the new Railway Act of May 8, held its first meeting in Madrid on June 26, under the presidency of the Minister of Public Works. On the next day, the Minister outlined to the press the Government's railway, road, irrigation and port improvement schemes. He explained that the railway companies had suffered enormous losses during the war and could restore normal working only with the aid of the State. This aid, together with the monetary assistance previously given, would mean that the financial interest of the State in the railways would be greater in amount than that of the companies themselves. It was logical, therefore, that the Government should be able to exercise a direct intervention in the working of the lines. There was no question, he added, of the State taking over the railways. Road transport would be reorganised and brought into line.

Among other new works, the Government proposed to proceed with the construction of the tunnels in Madrid for the inter-station central line, and with the Hippodrome terminal for the direct line to Burgos.

XUM

SIGNALLING ON PARIS METROPOLITAN EXTENSION LINE

Stop signals are preceded by two cautionary indications. Signal aspects are repeated for information of the guard by inductive apparatus

THE Sceaux line from Paris, formerly part of the Paris-Orleans system and now worked electrically on the overhead wire system as part of the Metropolitan services, has been equipped throughout with colour-light automatic signals and electric route-lever power frames at all important junction points. The work includes some novel features which distinguish it from earlier installations on lines of this kind in France. On the ordinary Metropolitan lines the full block overlap system, giving two red signals behind a train, has usually been employed, but on the Sceaux line the four-aspect system has been adopted. The absolute stop (controlled) aspect is given by one red light; the permissive (automatic) stop aspect by two red lights. When either of these is exhibited the next signal in the rear shows " caution " (two yellow lights), and the next in rear of that " warning " (three yellow lights); the signal behind that shows the ordinary single green light for " proceed." The single yellow aspect is used to indicate that a diverging route has been set up, and imposes a speed limit of 30 km.p.h. (18·64 m.p.h.) for passenger and 15 km.p.h. (9·32 m.p.h.) for goods trains. A theatre-type route indication appears with this aspect.

Between Paris and Massy the signal spacing is arranged for a headway of 2½ min. under clear signals, 1 min. 45 sec. under warning indications, and slightly over a minute under caution indications, at 50 km.p.h. (31 m.p.h.). Between Massy and St. Rémy these figures are doubled, and the average distance between signals becomes 1,500 m. (1,640 yd.). The power interlocking installations have full approach and route locking with sectional release to facilitate rapid handling of the traffic. Special attention has been given to the provision of means for working with the minimum of delay in case of failure, electric locking being provided to control the hand-setting gear used in case of point machine failure. Bouré key interlocking equipment is provided at stations where conditions do not justify full power signalling. Special additional signals are used to advise a driver when the contact line ahead is dead.

Signal and Speed Recording

The most interesting feature of the work is the provision of signal and speed recording apparatus on the train, with visual and audible indications for the guidance of the guard, who can then intervene if the driver fails to respect the running signal indications. The principles of the working can be understood from the accompanying diagram, reproduced from *Transports* for March and April, 1939.

The signal indications are transmitted from the track to the train by induction. There are four track inductors, energised by alternating current at 110 V. according to the condition of the signal the train is about to pass. An absolute or permissive stop aspect is repeated in the same manner, as are " caution " and " diverging route." The

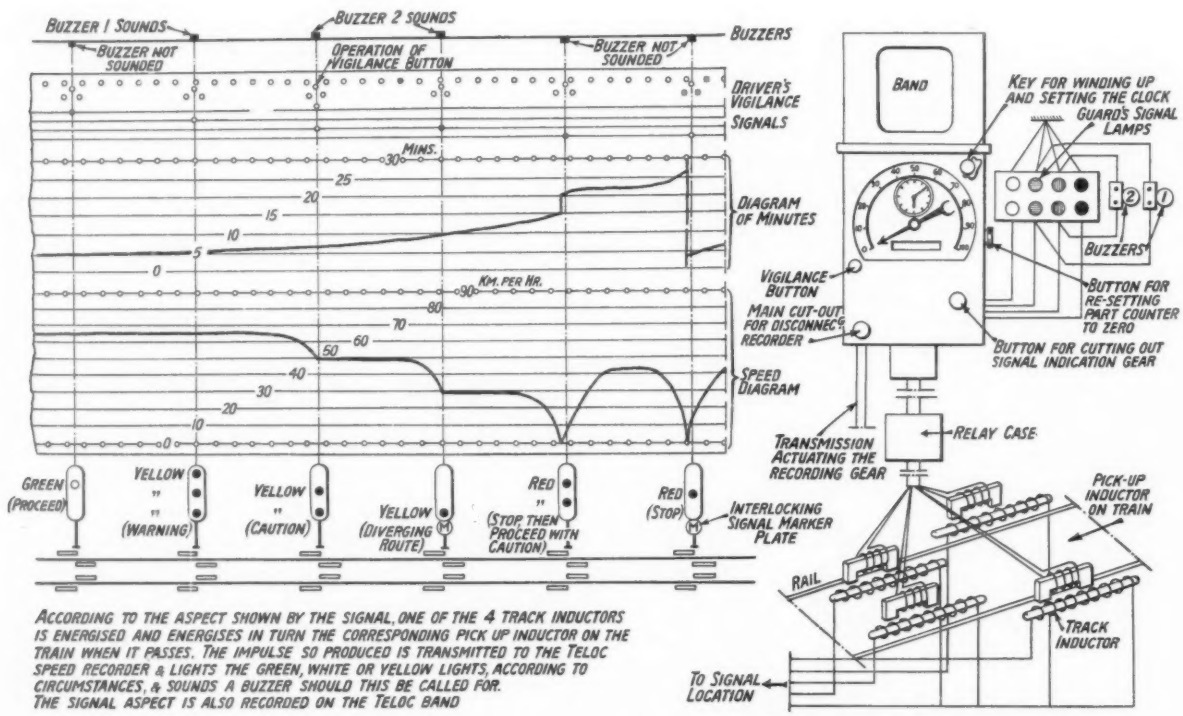


Diagram of inductive cab signalling apparatus, showing record made on the band of the Teloc speed recorder used on Sceaux line trains, Paris Metropolitan Railway

train carries corresponding pick-up inductors, which are energised on passing over an energised track inductor. Visual and acoustic signals are given as follow:—

Proceed—line clear	2 green lamps (no audible signal).
Warning	2 white lamps, 1st buzzer sounded.
Caution, or diverging route ..	2 yellow lamps, 2nd buzzer sounded.
Stop (permissive or absolute)	2 red lamps (no audible signal).

It will be noted that the band of the Teloc speed recorder records the sounding or non-sounding of the buzzers, the operation of the " vigilance button " by the driver, the signal aspects met with, the time, and the speed.

The apparatus is stated to have given every satisfaction after the initial troubles were overcome; the number of failures was less than 1 in 100,000 operations. Two failures in succession would be needed to produce a dangerous condition, a probability of less than one in ten thousand million movements. The mechanism in no way interferes with the action of the driver, but does record his vigilance and the signals he sees. All warning signals are repeated in such a way as to attract the attention of the guard. As there is no contact between train and track equipment, the working is unaffected by the weather.

The signalling is fed from 1,100 V. feeders, branching from the lighting sub-stations. Should these feeders fail, the signalling is automatically transferred to the lighting cables, and the lighting to the local supply mains. Telephones connect all signals, switch boxes, stations and other points with the sub-stations and principal operating centre, and all clocks on the route are synchronised.

Present-Day Indian Railway Problems

ADMINISTRATION of railways in India is complicated by many problems, only some of which are akin to those that have to be solved in this country; the others mostly arise from political considerations often conflicting with business principles. Under the new Constitution, the Government of India has to subsidise the revenues of the various Provinces, and one of the few sources from which it may be able to do this is from railway surpluses, if any. Nowadays, in common with those in other countries, Indian administrations find it difficult enough to earn a fixed return upon capital, and considerably more so to provide additional funds for subsidising the numerous self-governing Provinces, several of them larger than, say, Egypt. These difficulties arise from (*a*) the serious adverse effect upon earnings caused by the uncertainty of the international situation; (*b*) the enhanced cost of operation due to the steadily advancing costs of consumable stores and plant—resulting from heavy demand on raw and other materials for world rearmament—and of labour; and (*c*) the constantly-increasing pressure upon the railways, exerted in the legislatures, to reduce the cost of transport and use indigenous products irrespective of quality—both in response to the demands of *swaraj*, or the " self-supporting India " policy—and also to provide additional amenities for the travelling masses at current or even lower fares. When it is remembered that rates and fares in India are among the lowest in the world, the significance of two of these demands will be appreciated, and compliance with them is, therefore, not usually practical politics.

It is distinctly unfortunate that, just when Indian administrations are straining every nerve to perfect the commercial efficiency of their organisations, the spectre of subordination of management on strictly business lines to political considerations should loom larger than ever on the horizon. These considerations are backed by a large majority in the Assembly, which argues that cheaper transport will act as a stimulus to the development of trade, improve currency circulation, and otherwise benefit both Central and Provincial revenues indirectly; it professes to prefer risking the " substance " of a surplus and Provincial subsidy for this " shadow," but it is the taxpayer who will be asked to make good the reduced or lacking surplus. An increasing inducement to the self-supporting tendency in India today is the present state of world affairs, and rearmament in particular. Plant and rolling stock are difficult to obtain and deliveries are often long delayed, and India is consequently being forced to launch out upon the production of her own equipment. The war taught her to rely on Tata steel and with it build her own wagons and also some carriage underframes; carriage bodies she has always built. Locomotives and certain rolling stock parts, notably wheels and axles, however, she has continued to import.

But now, tardy deliveries are causing reconsideration of even this policy, and already metre-gauge locomotives are being built at the Bombay, Baroda & Central India Railway Ajmer shops, not only for that system but for other lines also. Unless conditions of delivery improve, it will not be surprising if broad gauge engines also are built in India before long. For even if locomotive construction in India in normal times is considered uneconomical, new engines must be obtained, and the combination of force of circumstances and Indian national inclination may swing the balance in favour of Indian manufacture. Once this policy is adopted, however, it is unlikely to be abandoned even when rearmament ceases and conditions abroad return to—we were about to say normal, but that word can hardly be used to describe what may come about when rearmament ceases. Should war supervene, then the development of Indian manufacture may be vital; should something new arise in the world to *assure* peace—military and economic—it would be at least harmless.

Locomotive Balancing

One of the numerous reports submitted to the 17th annual meeting of the Mechanical Division, Association of American Railroads, held at New York in June, stated that " the entire question of counterbalance is in a chaotic condition." In 1931 a recommended practice of counterbalancing locomotives was adopted, but three years later the Committee on Locomotive Construction reviewed the matter and advocated the cross balancing of the intermediate driving wheels. Since 1934 operating conditions have required schedules for considerably higher speeds than previously, and more refinement in counterbalancing has become necessary. A technical sub-committee of the Mechanical Division, A.A.R., now proposes to prepare a textbook on counterbalancing in which there shall be set forth with calculated examples a full theoretical treatment of the dynamic counterbalance procedure which, after approval by the main committee, will be used in analysing the balance conditions of several existing engines. A series of tests under service conditions is recommended, designed (*a*) to determine the proportion of the reciprocating weight in terms of the weight and length of the locomotive which may remain unbalanced, and (*b*) to determine the absolute merit in terms of locomotive riding and rail effect of various methods of balancing.

NEW 4-8-4 + 4-8-4 METRE-GAUGE BEYER-GARRATT LOCOMOTIVES, KENYA & UGANDA RAILWAYS

These engines are the first in the world to have this wheel arrangement and the largest 50-lb. rail locomotives ever built

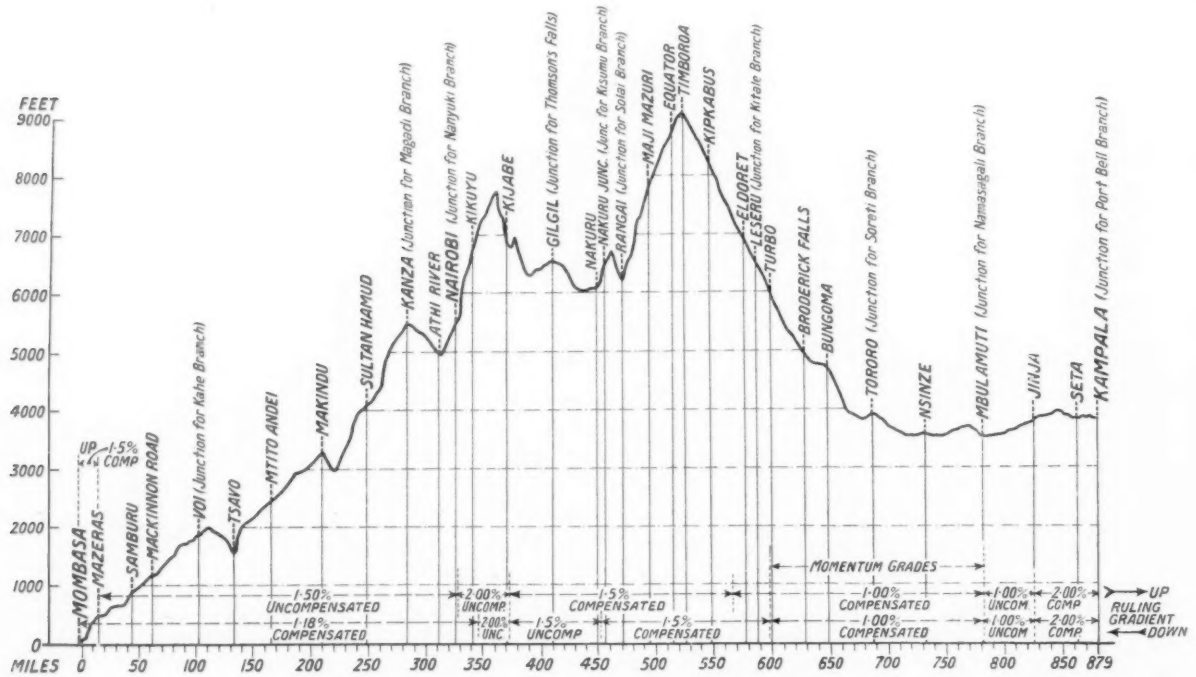
ONE of the exclusive characteristics of the Garratt principle of articulation is the ability to accommodate on each engine unit any wheel diameter or wheel arrangement which can be applied in the ordinary type of engine, and the new design of Beyer-Garratt locomotive we now describe and illustrate is an excellent example of the way in which so extended a wheel arrangement as 4-8-4 + 4-8-4 can be incorporated.

The order, comprising six locomotives of this type, has recently been completed by Beyer, Peacock & Co. Ltd. at Gorton, Manchester, and shipped, and some are already in service. An order for a further six has already been placed. This new type has been designed by Beyer, Peacock & Co. Ltd. to the detailed specification of the Chief Mechanical Engineer, Mr. K. C. Strahan (now retired), and the subsequent requirements of Mr. H. B. Stoyle, present Chief Mechanical Engineer and previously Locomotive Running Superintendent of the railway.

The Kenya & Uganda Railways administration has been a user of Garratt locomotives for several years, the 36 engines of this type operating about two-thirds of the total main-line traffic. Perhaps nowhere in the world have Garratt engines been worked more intensively, the mileages obtained being a record for a narrow-gauge line of this kind. The new design not only embodies the makers' improvements culled from the experience of Garratts in service in various parts of the world, but includes various modifications and alterations suggested by the railway, based on its long experience, which combine to make these new engines particularly interesting and outstanding examples of the present-day Garratt. They have been built under the supervision and inspection of the Crown Agents for the Colonies.

Before passing on to a detailed description of these engines, it is therefore interesting to observe the extraordinary size of the locomotive, a point with which we were particularly struck when we inspected one of the type, considering the restrictive conditions of a metre-gauge and 50-lb. rail. On this light rail—half the weight of the rail in Great Britain—and on a gauge 1 ft. $5\frac{1}{8}$ in. less with more difficult grade and curvature conditions, the tractive effort of the engine is equal to the biggest passenger engines in Great Britain while the boiler is practically equal in horsepower, having a similar size grate and an even larger barrel diameter despite the total height to chimney top from rail level of 12 ft. $5\frac{1}{2}$ in., which is nearly a foot lower than the highest British dimension. The locomotive further weighs roughly 20 tons more than the largest British types, the width over the running board is 9 ft. 6 in., and the footplate area is considerably larger than that of many standard gauge engines.

The design embodies many interesting features, some of which constitute a fundamental departure from the practice originally introduced by Beyer, Peacock & Co. Ltd. The two principal differences, apart from the wheel arrangement, are the inversion of the pivot centres, the male portion being on the engine unit instead of on the boiler cradle, and the alteration of the valve gear to bring the quadrant block of the links of each engine unit to the same position for whichever direction the engine is running.



Gradient profile of main line Kenya & Uganda Railways

This is the first time that the 4-8-4 + 4-8-4 wheel arrangement has been adopted; it is designed for 573-ft. radius curves on the main line and 275-ft curves in sidings. It has naturally brought fresh problems for solution such as the distribution of weight in relation to the strength of frames, alteration of the relative position of the pivot centres, clearances necessary for the longer units and method of compensation, &c., while the inside dimension between the unit bar frames of only 2 ft. in this case is an ever present difficulty to the designer of narrow-gauge engines. Further, it was specified that the engines were to be designed to facilitate conversion to 3 ft. 6 in. gauge with the minimum of alteration; thus the cylinders and rods and motion are centred for the wider gauge, a wider wheel centre providing for the shifting of the tyres outwards. The engine has also been designed to take care of the possible conversion of the Westinghouse brake to vacuum, when the gauge is altered, and also for the ultimate introduction of automatic couplers. Despite these features, however, a far greater measure of accessibility has been obtained throughout the locomotive than hitherto.

Previous Beyer-Garratt locomotives on the Kenya & Uganda Railways have been of the 4-8-2 + 2-8-4 wheel arrangement, with a coupled wheel diameter of 3 ft. 7 in. in keeping with an existing wheel on a standard ordinary engine. With the gradual speeding up of traffic and the extended use of Garratt engines over the whole main line, where the grades are easier, it was decided to increase the size of wheel in the present engines to 4 ft. 6 in., thus reducing the revolutions per mile by 20 per cent. with a consequently better balanced and freer running engine, resulting in considerably reduced maintenance. The introduction of the inside four-wheeled bogies has permitted a larger boiler for continued maximum output and also enabled larger coal and water supplies to be carried. The tracking properties of the engine have also been considerably improved by the guiding and protective effect of the bogies fore and aft of the coupled system, which should result in reduced wear of rails and flanges.

Existing Garratt engines, which work passenger and goods trains, are operated mainly by two sets of enginemen, either Europeans or Asians, and African firemen, one set resting in a " caboose " and changing over every 8 hours. This system has been in vogue for some years and round trips of 660 miles—Nairobi—Mombasa—Nairobi—are run daily. With the new engines it is contemplated to run from Nairobi to Kampala and back, a round trip of 1,100 miles, and to this end various features have been introduced to lessen the enginemen's responsibility and work on the road, such as roller bearings on all bogie wheels and an extensive use of grease lubrication as detailed later.

General Design

From the various illustrations a good idea can be obtained of the general layout of the locomotive. The boiler rests in the usual plate type of cradle frame, lengthened to take care of the new wheel arrangement; the plates are stayed together at each end by a steel casting of massive proportions, carrying the top portion of the pivot centre arrangement. Adjacent castings form a saddle to which the boiler is stayed, the firebox being supported by expansion brackets riveted to the wrapper sheet, and resting on the top of the cradle frame. The cradle frame is also suitably stayed along its length. The engine unit frames are of the bar type 4 in. thick, 35 ft. long, and are made from rolled steel slabs of Appleby-Frodingham Steel Company's manufacture. These are bound together by various steel castings, the principal ones including the drag box at the front end and a large casting incorporating the male portion of the pivot. Further, the cylinders, made in two castings, are bolted together on the centre line, giving additional rigidity to the whole chassis. The inside extremities of the bar frames have also substantial steel castings to carry the 20 odd tons with which the bogies are loaded. The pivot arrangement, as already mentioned, has been turned upside down compared with previous practice, access of coal or smokebox ash and dirt generally being thus prevented. The centres are provided with renewable seatings and a brass liner, while the bottom centre is fitted with a renewable ring. The design embodies the Beyer, Peacock patent adjustable arrangement for taking up wear; the adjustment, which can be made from the outside of the engine, is by means of a wedge acting on a segment. The side bearers are the maker's latest type consisting of grease-lubricated rollers.

The following are the principal dimensions:—

Cylinders (4), dia.	16 in.
,, stroke	26 in.
Piston valves, dia.	9 in.
,, ,, max. travel	5 in.
Coupled wheels, dia.	4 ft. 6 in.
Evaporative heating surface, tubes	2,015 sq. ft.
,, ,, ,, firebox	251 sq. ft.
(including two syphons and two arch tubes)	
Total	2,266 sq. ft.
Superheater (inside)	484 sq. ft.
Combined total	2,750 sq. ft.
Grate area	48·5 sq. ft.
Boiler pressure	220 lb./sq. in.
Coal capacity	12 tons
Water capacity	6,000 gal.
Tractive effort (at 75 per cent. b.p.)	40,670 lb.
,, ,, ,, 85 ,, ,,	46,090 lb.
Weight of locomotive in working order	186 tons

Boiler

As will be seen, the boiler is of quite exceptional size for the metre gauge, the outside diameter of the barrel being as large as 6 ft. 6¼ in. and the grate area 48·5 sq. ft. The pressure is 220 lb. per sq. in. The boiler barrel is made up of two sheets of Park Gate Iron & Steel Company's manufacture; the smokebox tubeplate is of the drumhead type. The boiler is fitted with a scum cock and blow-down cock operated from the side of the engine, and a main stop valve to the dry pipe is fitted in the dome. The firebox, it will be noted, is of the round-top type as against the Belpaire on previous Garratt engines supplied to this railway, while the inner firebox is of steel as against copper on previous engines. This inner firebox, which is fitted with two Nicholson thermic syphons and two arch tubes, is made of Colville's special Double Crown firebox steel and is completely welded throughout. The roof stays are of the radial type with three rows of flexible stays at the front end. Flexible stays are also provided in the breaking areas on the sides and also on the two top rows. The smokebox is of large capacity and fitted with a hot water ash ejector. Jumper top blastpipes have been fitted for experimental purposes but plain caps have also been supplied. The superheater is of the Superheater Company's manufacture, fitted with the multiple valve regulator positioned between the superheater and the cylinders, the superheater elements, header, and internal steam pipe thus being continually under full boiler pressure while also affording instant and fine regulation of the steam supply to the cylinders. There are 38 flue tubes, 5¼-in. outside diameter, with superheater elements 1⅜-in. outside diameter, 10 w.g. thick, having Melesco forged return bends and ball joint attachment to the header. The number of small tubes is 220 of 1⅞-in. outside diameter; all the tubes are of Howell's Aquacidox steel. The barrel is clothed, as are also firebox and cylinders, with J. W. Roberts's Limpet asbestos mattresses. The

boiler is fed by a No. 12 Gresham & Craven live steam injector placed beneath the cab, and also by a Davies & Metcalfe exhaust steam injector No. 11, both delivering into the barrel by double top-feed clackboxes. The exhaust steam injector has a capacity of 3,000 gal. per hr. and is controlled by a lever in the cab with a graduated scale by the regulation of which the fireman can maintain a constant feed to the boiler to ensure the maximum quantity of exhaust steam being utilised. The safety valves consist of three 2½-in. dia. of the Ross muffled pop type.

The firegrate arrangement consists of rocking firebars in two sections, each having a drop grate at the front, the firebars being operated by steam and hand. The control levers are marked for the up and level positions, the cylinder for each section of firebars being placed on each side of the boiler cradle frame. These can be seen in the illustrations. The ashpan is similar to the latest self-cleaning type fitted to South African Beyer-Garratt engines, discharging between the rails. It is fitted with a front and back damper and side doors and slides, all operated from the cab.

Cylinders and Valve Gear

The cylinders, of cast iron, have cast-iron pistons fitted with two narrow rings. The piston valves, of the trunk type, are 9 in. in diameter and fitted with four narrow rings. The valves, actuated by Walschaerts gear, have a travel of 5 in. The links are of the built-up box type with the reversing shaft fixed behind the link. Reference has already been made to the alteration in this design from the usual practice of combining the valve gears of the two engines. Previously one engine was always in back gear, continuous running thus being done with the quadrant block in the top section of the link. This, however, had the advantage of placing the valve gears in balance as regards their control, and a reversal of motion has thus had to be introduced to bring both engines into the same gear position. This has necessitated the introduction of a balance-weight which can be clearly seen in the close-up view of the front engine unit. The valve gear is controlled by steam reversing gear with an oil cataract locking cylinder similar to those already fitted to hundreds of Garratt engines. The crosshead, of cast steel, is of the Laird type. Lubrication to the slidebars is by a three-feed oil box going to the top and bottom bars; the lubrication being, so to speak, internal, the ingress of dust and foreign matter is prevented by the fitting of oil pads at the end of the slipper and on the crosshead to protect the sides of the bottom bar. The slippers are of cast iron with white-metal lining. Britimp metallic packing is arranged for the piston rods. Attention may be drawn to the layout of the valve gear generally, such as the length of the eccentric rod, which is fitted with S.K.F. spherical roller bearings. The connecting rod is also of considerable length, being 12 ft. 6 in. long. The big end is fitted with a floating bush for grease lubrication referred to later under this heading.

Coasting is provided for by the fitting of by-pass valves and air relief valves except in the case of the sixth engine, where the by-pass valves are blanked off and replaced by a new automatic drifting appliance manufactured by J. Stone & Co. Ltd., which has already been in experimental use in Kenya with very satisfactory results (see illustration). This equipment consists of a double-acting vacuum pump driven off the locomotive motion, controlling a steam shut-down and steam pressure reducing valve for regulating the supply of drifting steam to the cylinders. The purpose of this device is to render unnecessary the use of by-pass and air drifting valves by maintaining a controlled supply of low pressure steam to the locomotive cylinders when the locomotive is in motion and the regulator is closed. When the locomotive stops the vacuum pump ceases to function, so shutting off the supply of steam, any steam already in the steam chests (or leakage of steam) being exhausted to the atmosphere. The main feature is, therefore, to provide an automatic by-pass for the locomotive regulator controlled by the movement of the locomotive and the pressure existing in the cylinders.

Engine Unit Details

Attention is here directed to the close up illustration showing the front engine unit, which is generally similar to the hind engine unit. As regards the coupled wheelbase, the leading wheel has a flangeless tyre 5¾ in. wide, thus reducing the rigid wheelbase to 10 ft. The four-wheel bogies are identical except for the difference in the wheelbase, the outside bogies having 6-ft. 2-in. centres as against 5-ft. 3-in. centres on the inner. They are of the bar framed type with swan-neck compensating beams, the suspension being two point with side control. All bogie journals are fitted with Timken roller-bearing axleboxes, and the horn cheeks are lubricated from an adjacent oil box. The wheel centres, cast at the Beyer, Peacock steel foundry, have tyres of C.P. brand, secured by Gibson rings, as supplied by the United Steel Companies Ltd., and axles of Taylor Bros. manufacture. Springs are arranged above the axleboxes, and compensation is in two groups, namely, the outer coupled and intermediate wheels in one group and the driving, inner coupled, and inner bogie in the second group. The coupled axleboxes, designed for grease lubrication, are of steel, and have brass bearings pressed into the axleboxes with a lip on the hub side which bears against a cast iron wearing plate, studded on to the hub.

The axleboxes also have side liners of gunmetal, secured by cheesehead mild-steel set screws in accordance with the latest Kenya & Uganda Railways practice. The brake gear is of the Westinghouse type operating on the train and locomotive. Two 10-in. × 10⅝-in. air compressors, type KL2, are placed on the left-hand side of the boiler unit at the smokebox, one 15-in. × 6¼-in. brake cylinder type "V" on each engine unit. The footplate fitting consists of a No. 4 driver's brake valve with a C.6A feed valve. As the engine is intended to run mainly chimney first, the brake blocks are arranged behind the coupled wheels in both units. A hand brake is fitted, operating on the hind engine only. Sand gear of the Lambert type is also arranged particularly for forward running, the application being to the leading coupled wheels of the front and hind units and behind the coupled wheels of the hind unit only for backward running, there being thus two sand boxes on the front unit and four on the hind. The tanks and bunker, it will be noted, have snap-head rivets, the water tanks having no bolt holes in the water space. Incidentally, the tanks and bunker are more strongly built than in the previous engines, and more efficiently baffled. At the end of the tanks boxes are located for housing three screw jacks. Under this heading mention may be made of the improvements made to the steam pipe layout; all joints are considerably stronger and of the double-cone type. The main steam pipe to the hind engine it will be noted runs along the outside of the boiler cradle frame, passing under the cab by a generous curve and insulated from the footplate. A double-expansion gland is provided, with lubricators located below the oil cylinder of the steam reversing gear.

Lubrication

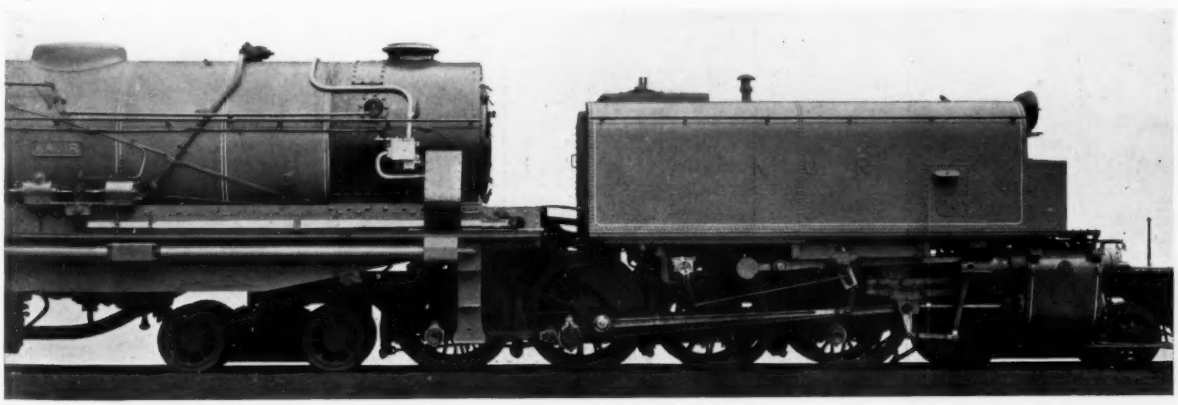
Lubrication to the cylinders is provided for by two Wakefield Eureka lubricators, type "D," one a five-feed

Three-quarter view of new Kenya & Uganda Railways locomotive on 275-ft. radius curve

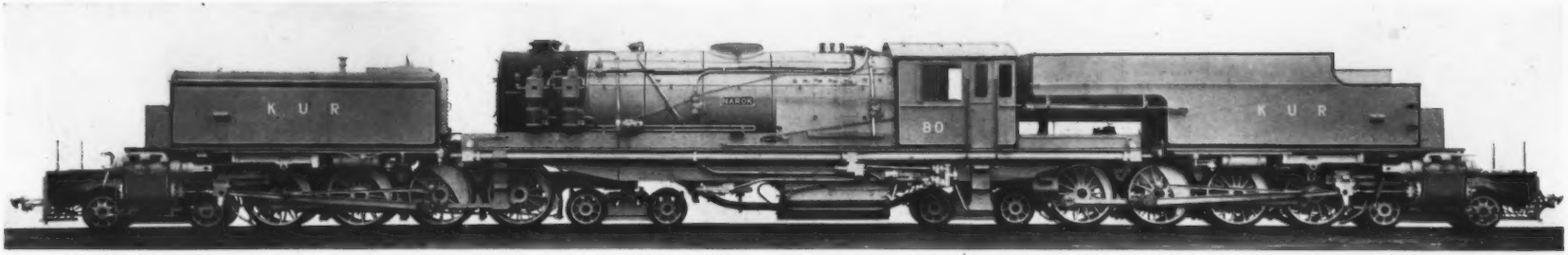
and the other a four-feed. The five-feed lubricator lubricates the four cylinder barrels and the Westinghouse pump. The four-feed lubricator lubricates each steam-chest. The exacting service which these locomotives are required to perform consequent on the heavy gradients and length of run has necessitated special attention being given to the question of lubrication, and at the same time lessening the driver's work, and to this end the Ajax system of hard and soft grease lubrication as supplied by Whitelegg & Rogers Limited has been applied to the axle-boxes, valve gear, brake and spring rigging. The Ajax lubricators fitted to the boxes of the coupled wheels contain pads of hard grease which provide lubrication for 20-30,000 miles, during which time no attention is required by the engine crew. Monthly inspection is performed by the shed staff. The hubs are also lubricated by grease. One application of soft grease to the valve gear is considered sufficient for 2-300 miles, depending on conditions, and the other parts of the engine are greased every 4-5,000 miles. When it is remembered that round trips of as much as 660 miles are already being run, and up to 1,100 miles are contemplated, the importance of a trouble-free system of lubrication devoid of attention to trimmings, &c., becomes evident. A four-feed Wakefield mechanical lubricator, one on each engine unit driven off the link, supplies oil to the ball-joints and pivot centres.

Cab and Footplate

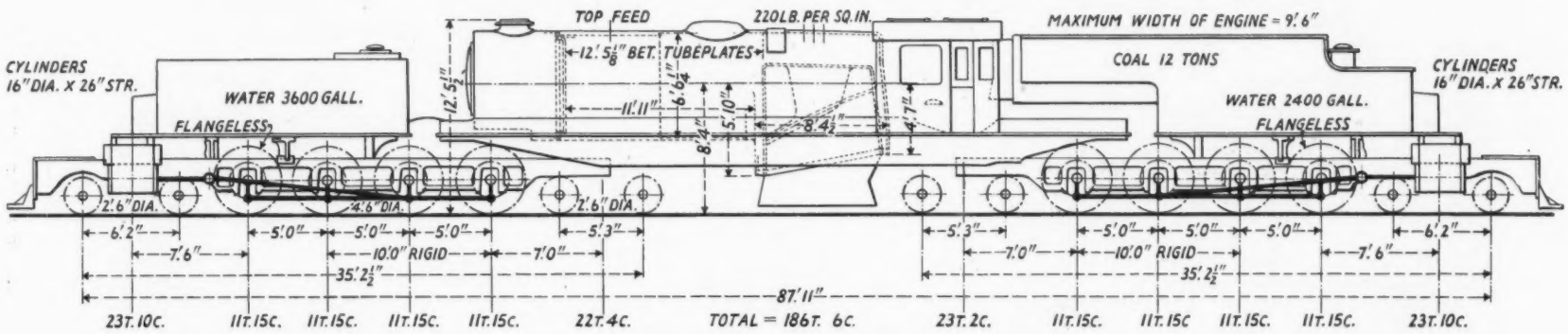
Reference has already been made to the large cab area, particularly for the metre gauge. As extremes of cold and heat are encountered the cab has been designed so that it can be entirely closed in or opened to provide the maximum of air. The spectacle windows have been made as large as possible, the side windows being fitted with double sliding louvres and removable elbow rests. Cushioned collapsible seats for the engine crew are also provided and an additional two seats on the back plate of the cab for inspectors. Side doors are also fitted, made in two parts to enable the top half to be opened separately. The coal bunker is so designed as to provide a large opening when required either for ventilation or access of enginemen to the bunker. At the same time it



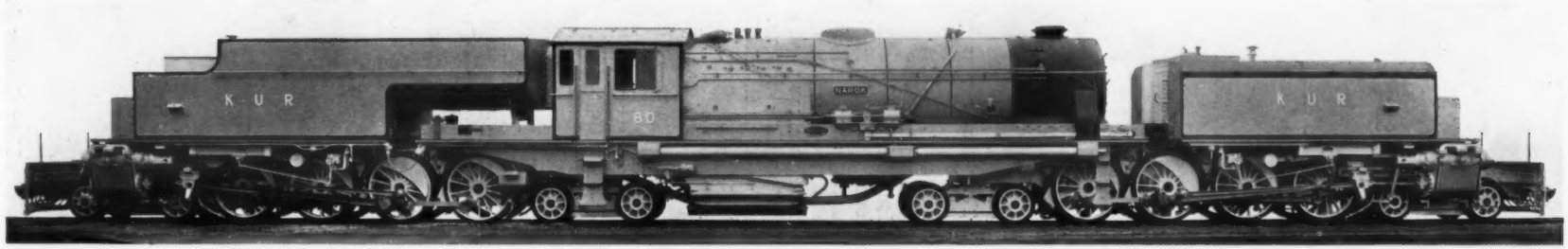
View showing front engine unit, steam reversing gear, and new drifting valve



View of left-hand side

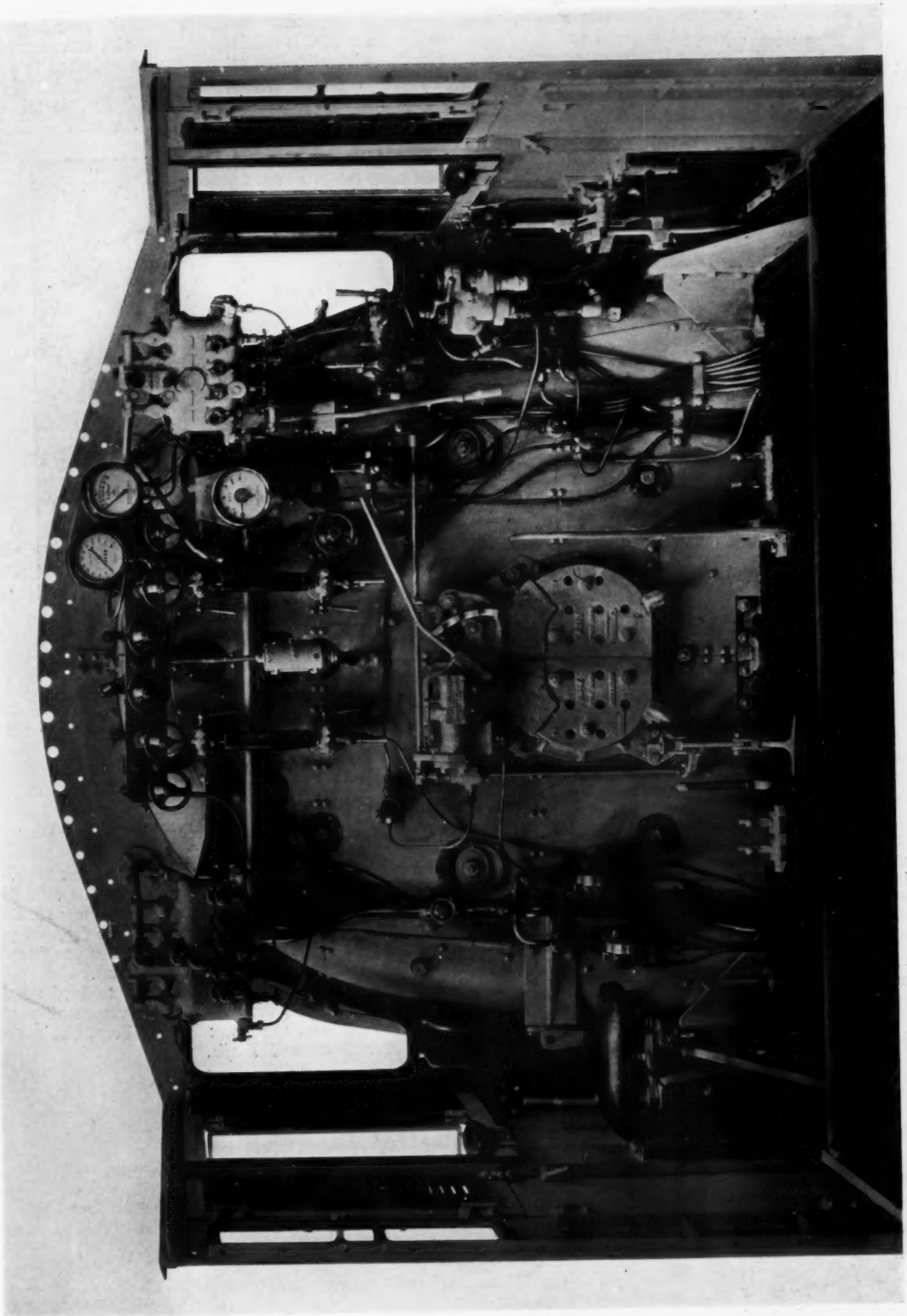


Dimensioned outline diagram



View of right-hand side

NEW 4-8-4 + 4-8-4 *BEYER-GARRATT LOCOMOTIVE, KENYA & UGANDA RAILWAYS*



Interior of cab of the new Beyer-Garratt 4-8-4 + 4-8-4 locomotives, K. & U.R.

has an arrangement of doors which enables the back of the cab to be completely closed or to leave just the required opening for firing. The firehole is fitted with an Ajax patent automatic firedoor operated with compressed air by the action of the fireman's foot on a pedal or by a hand lever. A coal watering pipe and ashpan drencher are provided on the fireman's side. A fire-screen is fitted to protect the driver's legs. The regulator handle is of the type usual for the multiple-valve regulator, and an extra handle is provided on the fireman's side. Steam for the various fittings is obtained from a turret located on the top of the boiler outside the cab, the various operating handles having their functions clearly marked, as are also all control levers on the floor.

Electric lighting equipment is of J. Stone & Co. Ltd. manufacture, of that firm's LBB 32-volt type. The electric headlights in this case are being supplied and fitted abroad from stock by the railway. The cab installation comprises lights behind the lubricators, a light to the gauge glasses, and a screened light in the cab roof.

All six locomotives are provided with Stone-Deuta speed indicators, manufactured by J. Stone & Co. Ltd. Five of the engines are fitted with the electrical type, indicating speed only, and having the drive to the alternator taken from a pulley bolted to the face of the rear bogie wheel under the cab, this driving the alternator or transmitter by a coiled wire belt, the transmitter being bolted to a carrying bracket off the bogie equalising beam. From the transmitter the electric flex is led through flexible tubing and conduit to the speed indicator in the cab. The other locomotive is fitted with a recording instrument of the electro-magnetic type with mechanical drive.

The water gauges are of the Klinger reflex type. A chime whistle is located on the slope on the side of the smokebox and operated by steam from the cab. The steam reversing lever, Westinghouse brake driver's valve, and the regulator, &c., have been carefully positioned for comfortable working from the driver's seat.

The engines, which are numbered 77 to 82, have been named after various districts and Government posts in Kenya and Uganda, as follow: *Mengo, Teso, Uasin, Gishu, Narok, Marakwet,* and *Wajir.*

Offloading and assembling of the first of the new engines at the quayside, Kilindini Harbour, Kenya & Uganda Railways

RAILWAY GAZETTE
READ WHEREVER THERE ARE RAILWAYS

LONG WELDED RAILS

Some notes on experiments with the end-to-end welding of rails into lengths up to 180 ft. on the Southern Railway

By A. H. CANTRELL, B.Sc. (Eng)., Assoc.M.Inst.C.E.

DURING the last few years, railways in many countries have been experimenting with rails welded into various lengths, by different processes, but usually by either the Thermit or flash-butt methods. Various electric-arc welded joints have been tried, but have not been used generally. The Delaware and Hudson Railroad in America has adopted long welded rails extensively. Rails are welded by the flash-butt process in the shops, transported to the site, laid in the track and Thermit-welded to form longer rails, the maximum length so far being 7,700 ft.* Only on one occasion has trouble occurred by the track buckling, when it pushed out of line to the extent of about 4 in.

In this country experiments have been carried out by most railways. The L.P.T.B. has done more welding than others, but as the track is mostly in tunnels where temperature variations are small, difficulties are not great after the work has been completed.

On the Southern Railway for some years welding of test lengths of track under varying conditions has been done, and by permission of the Chief Engineer, Mr. G. Ellson, the writer gives some of the results and deductions which he has made from careful observations.

The first welded joints on the Southern Railway were made at Worplesdon, near Guildford, in 1932, by the Thermit process, and have been quite satisfactory. Similar joints were made at South Croydon in a heavily used electrified line, and near Mitcham Junction in fairly heavily used track, both in September, 1935. In each case 60-ft. rails were welded to form 120-ft. lengths. The work was carried out alongside the track, and the rails put in the chairs a few days later. The former site is on an embankment, and the latter in level country. No difficulty in maintenance has been experienced so far.

Sorbitically treated rails were used. The necessary heating and slow cooling of the rails acted as an annealing process and the sorbitic structure of the surface was destroyed. As was expected, slight dips occurred in the softer metal at the joints after a short time, but, once having been formed, the surface became work-hardened, and the hollows, which are in the region of 0·024 in. deep maximum over a distance of about 1 ft., have not changed since.

Subsequently, several tunnels were relaid with rails 180 ft. long, either welded *in situ* or at a suitable site near by, the latter proving the more satisfactory method.

In March of last year nearly three-quarters of a mile of track was laid in the down line near Hildenborough, where speeds frequently exceed 80 m.p.h. Rails 180 ft. long were used, although the position is in a cutting which gets very hot in the summer. Part of the track is straight and part on a curve of 100-ch. radius. The usual pressure Thermit process in which a shim is used in the head of the rails was adopted, as carried out by the firm of Murex Limited.

Another length of track was laid partly with 180-ft. and partly with 120-ft. rails in the fast-running down line between Polhill tunnel and Dunton Green in August of last year, the Boutet system of welding being adopted. The Boutet system is new to this country, but in general principle it is similar to the Thermit processes, except that no powerful clamp is used for pulling together or aligning the rails, nor is it necessary to plane the rail-head ends in order to make them truly square. A light clamp is used for holding the mould to the previously aligned rails, and, by means of a petrol-vapour and air blow lamp, the whole is heated to a bright red heat. Molten steel of special composition resulting from a thermite action is then poured in and the whole allowed to cool for a minute or two before the mould is taken off. While still red-hot, most of the superfluous metal is removed with a set, and the cooling process goes on. The head and running edge are later trued up, first by means of a carborundum wheel and then a flat file.

Thermit-welded joint near Hildenborough, S.R.

When the joint has been superficially examined, a small portable furnace is put round it and the whole heated up again to an annealing temperature, after which the head is treated with a very fine spray of water for about one-and-a-half minutes. This restores the sorbitic structure and the rail surface is practically uniform throughout its length.

The effect of variations in temperature on long rails has received much attention in recent years. It is not possible to state as a general conclusion that the coefficient of expansion of rails in the track is a definite fraction of that of free steel. Although it is recognised that allowance must be made for the method of fixing the rails to the sleepers, it is too often forgotten that the length of the rail has a big effect on the so-called coefficient of expansion. This can be explained as follows :—

Assuming the rails have been laid at a temperature of about 40° F. at night, and that the stress then is naturally

* Described in THE RAILWAY GAZETTE of March 3, 1939 (p. 357)

Down Continental express passing over the 180-ft. welded lengths of rail, near Hildenborough, Southern Railway

zero, a rise in temperature which may occur after the track has been keyed up will tend to cause the steel to expand. The rails, however, will normally be held firmly in the chairs, and the expansion will be resisted by the ballast tending to prevent the sleepers from moving. It has been found that under normal conditions, a force of about a ton is required to move a sleeper in the direction of the line in which it is laid. As a result, the temperature expansion effect is resisted quite appreciably, and rail expansion will be greater per unit length near the ends than in the middle, where no movement can occur until a greater number of sleepers have been pushed through the ballast.

Further consideration shows that for a small rise in temperature, possibly only the end few sleepers will move. The central portion of rail has not been allowed to expand, and therefore the stress set up in it is equal to that in steel which is subjected to an increase in temperature while its ends are irresistibly held. As a result, a uniform stress will be induced in the central portion of the rail, while beyond it, the stress will step down at each sleeper, becoming zero at the end if the friction between the rails and fishplates is ignored for the present. A further rise in temperature will cause the rail nearer the middle of the length to expand, and if of sufficient magnitude, even the centre will be affected. The resulting distribution of stress will then be zero at the ends stepping up at each sleeper position to a maximum in the middle. With further increase, the rail will expand uniformly throughout its length without any change in stress until its ends butt up against the adjacent rails. Then, once more, the stress throughout increases uniformly as the temperature increases.

When conditions begin to cool, the stresses decrease uniformly until adjacent rails begin to separate, and the expansion gap once more opens. As the temperature continues to fall, the compressive stress in the middle of the rail length gets less, while nearer the ends the rails are placed in tension, with zero load at the ends if the fishplate friction is neglected. A further fall will change the central compression into tension until it becomes greater than elsewhere, and finally the rails will grip the fishbolts and a continued drop in temperature will result in a uniform increase in stress throughout the rail length and in the bolts.

From these remarks it is apparent that, unless suitably restrained, the track is more likely to buckle in the middle portion of a rail length than at the joints, because although the latter are the weakest parts of the strut, there is a much smaller compression to withstand there. The central load depends on the number of sleepers which the force induced by the temperature increase is able to move. With a normal sleeper resistance and the usual temperature range in this country, the force is able to move the sleepers in about the end 150 ft. of a very long length, if the track is laid at about 45–50° F. As a result, if a length of rail greater than 300 ft. (*i.e.*, 150 ft. on each side of the centre) is subjected to probable temperature variations, the middle portion, equal in length to the excess above 300 ft., will have a uniform load, however great its length. Therefore, if track can be made stable with rails 300 ft. long, there would appear to be no reason for limiting the length to that figure.

Another aspect of the problem which must be considered carefully is the tensile stresses at the expansion joints at low temperatures. In order to keep down compressive stresses, rails should be laid at moderately high temperatures, such as 60° F., with, say, ½-in. gaps between them. This, however, results in higher tensile loads in cold weather, and the design of the expansion joints must be carefully examined. But, once more, any increase in rail length above about 300 ft. will not make matters worse, as only portions at each end expand and contract.

From measurements taken at Hildenborough, it seems that the maximum load reached in the 180-ft. rails, supported on 78 sleepers, may have been about 25 tons per rail, and the maximum tension at the joints about 8 tons per rail; but these figures must be considered in conjunction with the fact that the rails were adjusted at about 50° F., so that the expansion joints were $\frac{5}{8}$ in. These two factors have an important bearing on the maximum loads.

So far no difficulty has been experienced in maintaining track in which the 180-ft. rails are laid, but careful attention has been given to the ballasting. In double track, a shoulder of crushed granite 2 ft. wide has been made on the cess side and between the sleepers the stone has been placed at least as high as their top surface.

The sleeper spacing is most important. As has already been shown, the stress distribution, and therefore expansion and contraction, depend on the resistance to motion of the sleepers, as it has been found that generally this is less than the grip of the chairs, especially if suitable steel keys are used. If a wide spacing is adopted, a longer length of rail will be allowed to expand or contract than with closer spacing, and the value of the expansion gap will be decreased.

As regards details to be considered in handling long rails, when supported on several coupled bogie wagons, they can be negotiated at slow speeds round curves 6-ch. radius carrying 30 lengths at a time. On the Southern Railway, 180-ft. lengths are loaded on to and off-loaded from the wagons by Robel rail cranes,* thus reducing the manpower required very considerably. In Germany and the United States, longer lengths, up to 1,500-ft., are transported by train and unloaded by sliding one end off the trucks and gradually pulling the rest of the length down. The flexibility of the rail, even when flat-bottomed, is amply sufficient for this.

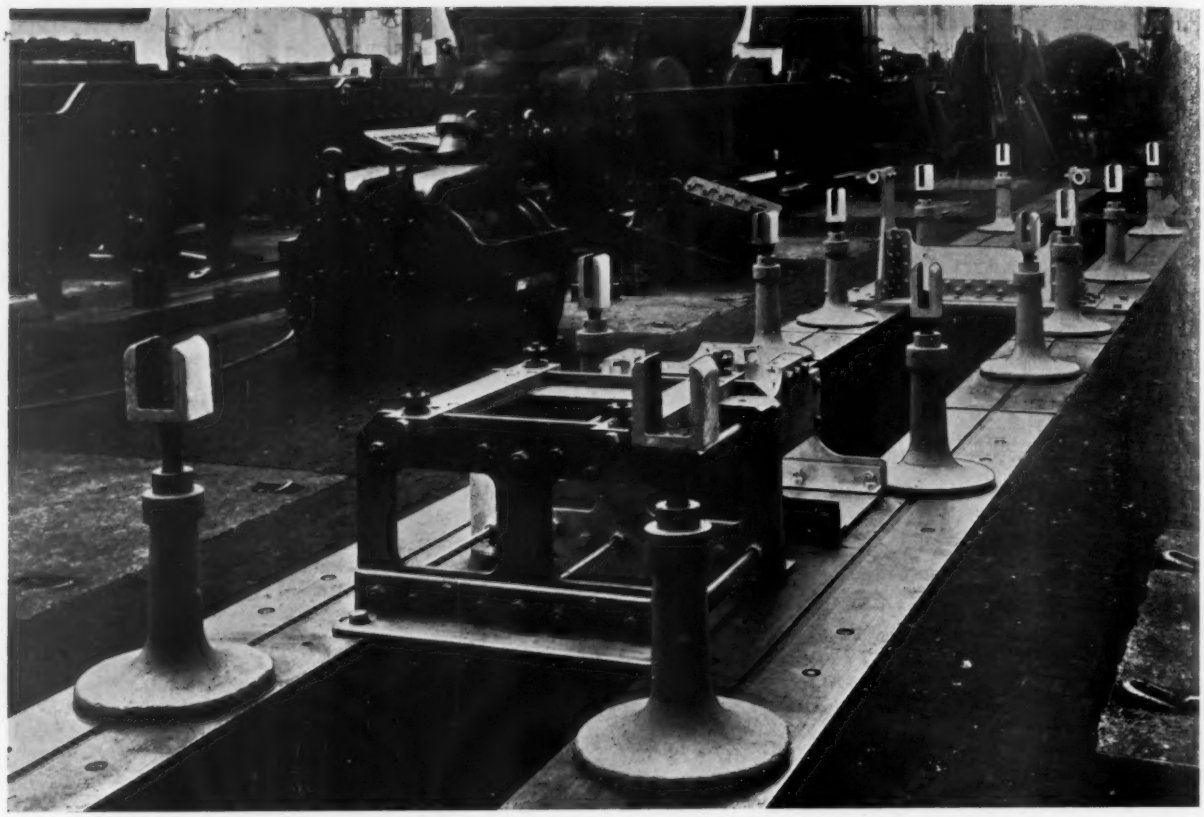
Where there are insulated joints in the track and also on each side of the points and crossings, it is advisable to have at least one, and for very long lengths, more than one, ordinary rail to act as closures, in order to facilitate replacement of insulation or crossings, &c., and to relieve them of high stresses.

Finally, it appears that although the difficulties prophesied for long lengths of rail are gradually being overcome or proved false, care must nevertheless be exercised in laying and maintaining them, and the further experiments which are being carried out are still required and should prove useful and enlightening.

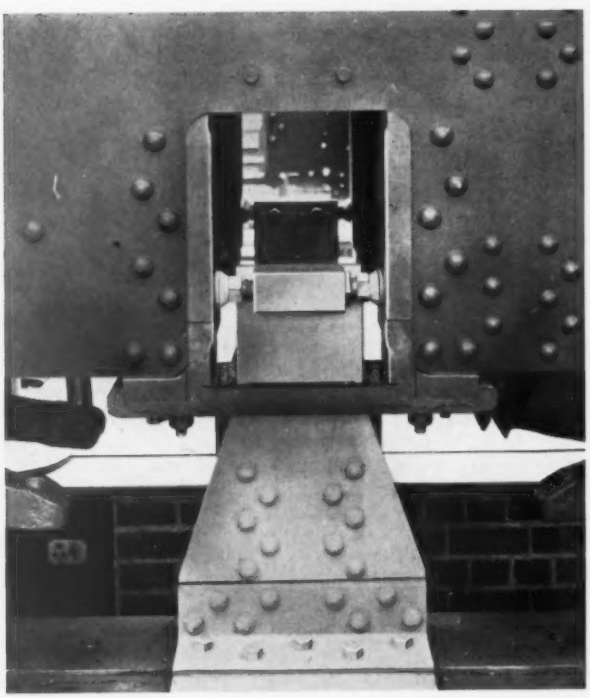
(*We comment editorially on this subject on page* 83.)

THE RAILWAYS OF ESTONIA.—The rising prosperity of Estonia has been reflected in the traffic of the railways, and gross earnings increased in 1937-38 by 13·4 per cent. to 15,613,809 kr. Working expenditure was 14,107,746 kr., the ratio being 90·35 per cent. The number of passengers increased by 8 per cent., to 11,534,000, and goods by 12·9 per cent. to 1,823,000 tons. The Estonian railways, with a few unimportant exceptions, are owned and worked by the State. There are 772 km. of broad gauge (1·524 m.) and 675 km. of narrow gauge (0·750 m.). The capital value of the railways was on April 1, 1938, estimated at 86,686,800 kr. The rolling stock included 196 steam locomotives, and 16 electric and other locomotives; 511 passenger vehicles, and 5,553 freight cars. The foregoing information is derived from the Report on Economic and Commercial Conditions in Estonia, published by the Department of Overseas Trade.

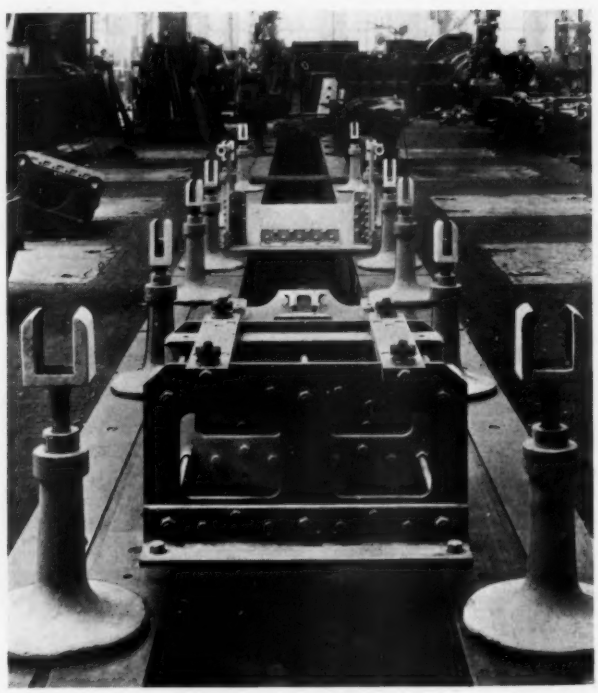
* Described in THE RAILWAY GAZETTE of July 16, 1937 (p. 115)



Pit equipped with locating fixtures ready to accommodate a "Castle" class locomotive



Close-up of driving horn fixture



Another view of the stands ready to receive a frame

BUILDING NEW LOCOMOTIVES AT SWINDON, G.W.R.

BUILDING NEW LOCOMOTIVES AT SWINDON, G.W.R.

The use of rebuilt erecting pits is leading to more economical and effective results

CONSIDERABLE alterations in new locomotive erection technique have been carried out at the locomotive works of the Great Western Railway at Swindon, and during a recent visit to the works we were enabled by the courtesy of Mr. C. B. Collett, the Chief Mechanical Engineer, to investigate the system, which has many points of interest. Four engine erecting pits have been rebuilt, the pit rails being replaced with steel topped pits in which steel plates are formed with a longitudinal groove for locating the adjustable frame stands. The width of the pit between the steel plates is 2-ft. 8-in. Between the pit walls are points for gas, electric, and compressed air supplies. The main features in connection with the pits are the provision of locating fixtures to hold and set the driving horns, cylinders, and in the case of four-cylinder engines, the inside motion plate casting complete with bogie centre pin.

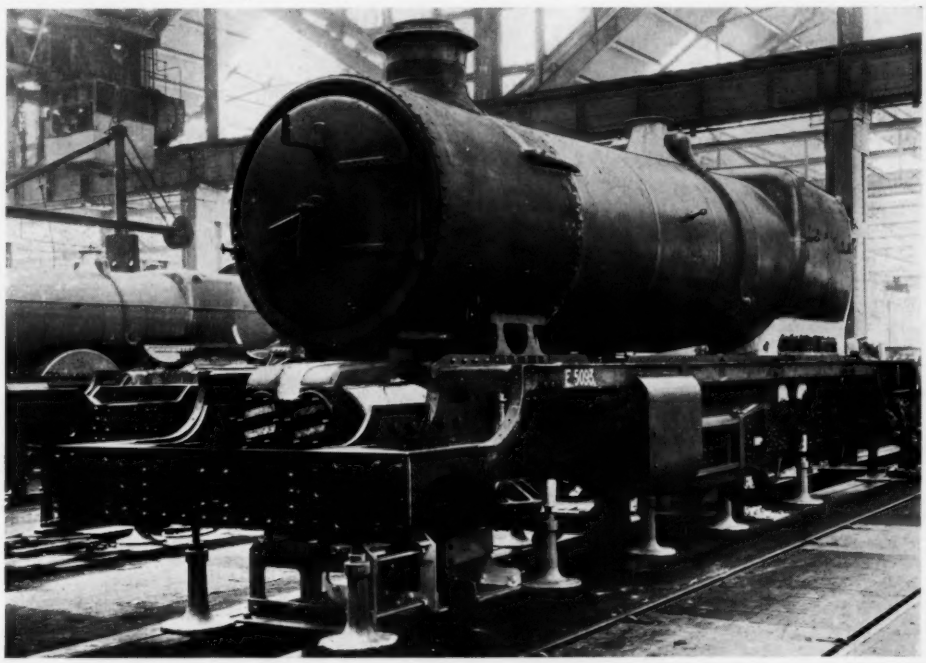
The accompanying illustrations assist in explaining the general layout of the pits and their equipment. The first (on p. 104) shows the fitting referred to ready to accommodate a new engine of the four-cylinder " Castle " class. The setting height is fixed from the rear of the two front fixtures, *i.e.*, that of the motion plate. The inside cylinders are accommodated with their cylinder cock faces on the four adjustable nuts of the front fixture.

A close-up of the driving horn fixture is shown in the next illustration, the near driving horn being brought by the front adjusting screw into close contact with the rear adjusting screw, which is set and locked in position. This forms a positive setting position for the frames independently of the cylinders. The cylinders are then set in correct alignment by means of the Zeiss telescope, the adjusting screws on the cylinder stand being used to obtain the final setting. The original setting of the rear adjusting screws of the horn fixture is also made with the Zeiss telescope on an assembled frame. For subsequent engines these adjusting screws remain set and, as mentioned, the frame is located against them by tightening the leading screws. In dealing with a batch of engines, after the first one only a very small adjustment of the cylinders has to be carried out when the telescope is in position.

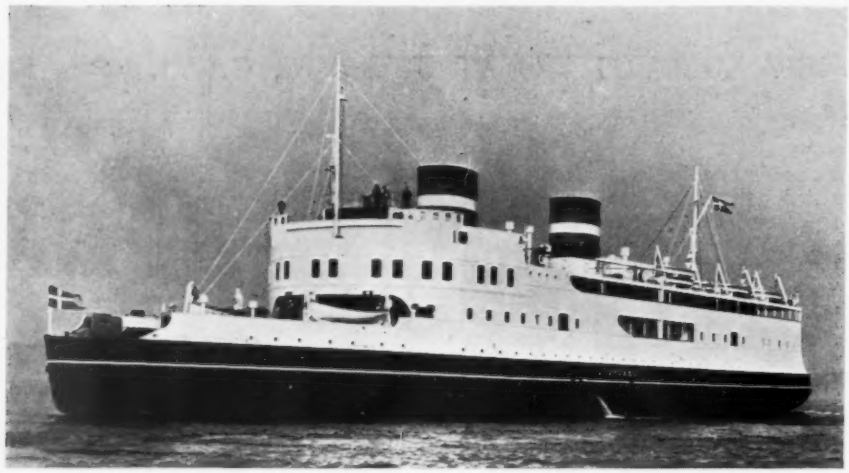
The third illustration gives another view of the stands ready to receive a frame and on the right is a pair of " Castle " class frames laid on steel trestles. In this position the outside cylinders are located, sighted with the Zeiss telescope on to their correct alignment and location to the driving horn. After being set the cylinder and frame holes are broached. When the frames have been erected and the inside cylinders, motion plate, and other parts set, the outside cylinders are ready for applying and bolting up. In this view also can be seen the concrete bases for the portable hydraulic power.

In the case of two-cylinder engines of the standard outside cylinder types, the front ends comprising the wrought steel extension frames, racking plates, buffer beams, corner brackets, cylinders, &c., are built up on a separate jig as a unit and are then brought to similar stands on the erecting assembly. Here they meet the main frames, which have been set on the horn centring stand, and they, similarly, require only final setting with the Zeiss telescope.

The new erecting stands have reduced considerably the time taken to erect and finish new locomotives and an output of $2\frac{1}{4}$ engines a week is being maintained with ten engines under erection at any one time.



" Castle " class engine ready to leave the assembly pit



Left: New Great Belt diesel ferry "Storebælt," Danish State Railways. The engines are two-stroke, and are capable of giving a speed of 16¼ knots. (See our Overseas columns, May 12, page 774)

Right: A building of unusual interest, built by the Southern Railway on its new estate at Southampton Docks, for the distribution throughout Southern England of the products of Cadbury Brothers and J. S. Fry & Sons. In 1927 this firm opened near the outer dock a joint distribution depot, and, although twice enlarged, present-day requirements have necessitated larger and more modern accommodation. Temperatures and humidity are controlled throughout the stockrooms of this new depot

A fine series of 16 masonry flying arches strutting the retaining walls in Chorley cutting on the Manchester-Blackpool main line, L.M.S.R. Note the 11 single stones in the crown of each, protected from the weather by stone slabs. The arches have stood a severe climate and constant vibration for 96 years with a minimum of maintenance.
(See editorial note on page 82)

RAILWAY NEWS SECTION

PERSONAL

Mr. Arthur Forbes Smith, whose appointment as Assistant Goods Manager, Southern Area, L.N.E.R., was recorded in our July 14 issue, is a native of Morayshire and was educated at Gordon School, Huntly, and at Aberdeen University, where he graduated as M.A. in 1914. He served in France throughout the great war with the Gordon Highlanders, being seconded for duty in 1916, on recovery from wounds, with the Director of

Mr. A. Forbes Smith

Appointed Assistant Goods Manager, Southern Area, L.N.E.R.

Docks, soon after the Directorate General of Transportation was formed. After the armistice Mr. Forbes Smith was transferred to Rotterdam, where he was responsible on the military side for the transit up the Rhine of supplies for the Army of Occupation and the German civil population. On joining the London & North Eastern Railway, Mr. Forbes Smith had experience in the Works Section of the Chief General Manager's Office, and was made head of the Road Transport Section when it was first formed in 1929. In this capacity he was connected with the negotiations which led to the acquisition by the railway companies of an interest in omnibus undertakings, and with the operation of the Road Traffic Act, 1930. In 1932 he was associated with the Salter Conference, having been closely concerned in the preparation of the statistical information on which the financial recommendations of the conference were based. Later in the same year Mr. Forbes Smith had a period of special duty with the Railway Companies' Association in connection with the passage through Parliament of the Road and Rail Traffic Act, 1933. In 1934 Mr. Forbes Smith was appointed Chief General Manager's Assistant for rates, statistics and Parliamentary matters, being associated with Sir Ralph Wedgwood in the major commercial railway questions of the last five years, and particularly with the work of the Transport Advisory Council. In the winter of 1936-37 he toured India as Assistant to the Indian Railway Enquiry Committee (the Wedgwood Committee). Early this year Mr. Forbes Smith had another spell of special duty with the Railway Companies' Association in connection with the "square deal" proposals, being concerned especially in the negotiations with the road haulage industry. He is a member of the Road and Rail Central Conference.

Mr. Thomas Brewer retired on June 30 from the position of District Superintendent, Waterford, Great Southern Railways, Eire. He has been succeeded by Mr. J. Breen, formerly Goods Agent at Cork.

Mr. J. Breen was born in 1885 and educated at Carlow. He joined the Great Southern & Western Railway in 1903 as a clerk in Cork goods depot. In 1914 he became Accountant at Limerick goods, and four years later was appointed Chief Clerk in the offices of the District Superintendent at Limerick. In 1919 he went to Cork goods as Chief Clerk. He was transferred in 1933 as Goods & Passenger Agent at Waterford, and a year later was appointed to take charge of Cork goods depot, whence he goes to take up his new position. Mr. Breen has acted as a member of an economy commission on the Great Southern Railways.

Mr. A. J. F. Bunning, District Traffic Superintendent, Nigerian Railway, has been appointed Traffic Manager, Gold Coast Government Railway.

Mr. Thomas T. Irving has retired from the position of Chief Engineer, Central (Toronto) Region, Canadian National Railways, and has been succeeded by Mr. Barton Wheelwright, formerly Engineer for Maintenance of Way, Central Region.

Mr. H. Wheeler, who retired from the position of Assistant to the General Manager, Great Western Railway, on April 30 last, has joined the boards of George Wimpey & Co. Ltd., and Twisteel Reinforcement Limited.

Mr. John H. Taylor, M.Inst.C.E., Principal Assistant to the Chief Engineer, Central Argentine Railway, sailed for England on leave on June 13.

Mr. C. L. Simpson, A.M.Inst.C.E., who as we reported on July 7 has been appointed Divisional Locomotive Superintendent, Bristol, G.W.R., was educated at Blundell's. He went to the Great Western Railway in 1909 and was employed in the shops at Newport, Dock Street. He was transferred in 1911 to Swindon where he gained experience in the factory, test house, and drawing office. In September, 1914, he enlisted in the Public Schools Battalion, Middlesex Regiment, and in 1915 he took a commission in the Royal En-

Mr. C. L. Simpson

Appointed Divisional Locomotive Superintendent, Bristol, Great Western Railway

gineers; he served in France with the 94th Field Company, R.E., 19th Division and other units, and subsequently attained the rank of Captain which he now holds in the Territorial Army Reserve. Before he went to Bristol in 1920 as Inspector, he had gained some footplate experience. In January, 1922, he was appointed Assistant to the Divisional Locomotive Superintendent at Bristol, and in January, 1933, became Assistant to the Locomotive Running Superintendent and Outdoor Assistant to the Chief Mechanical Engineer at Swindon, the position he now vacates.

Mr. W. H. Ensor, whose appointment as District Locomotive Superintendent, Derby, L.M.S.R., was recorded in our issue of July 14, received his locomotive engineering training in the Midland Railway works at Derby. He had experience in the Running Department and also on the footplate. His first appointment was in 1915, as draughtsman in the Locomotive Drawing Office at Derby, where he remained until

New Marine Station at Calais

(*See article opposite*)

Above : General view of Marine station at Calais with cross-channel steamer alongside

Left : The new Customs hall

Below : New platforms with reinforced concrete roofing

1921, when he was appointed District Locomotive Superintendent, Leeds. In 1924 he went to Normanton in a similar capacity. In March, 1927, Mr. Ensor was promoted to be District Locomotive Superintendent at Chester, a position he held until July, 1936. In that month he went to Shrewsbury in a similar position. He will take up his new appointment at Derby in August. Mr. Ensor is a Member of the Institute of Locomotive Engineers.

Below are the names of successful candidates, connected with railway or railway-associated undertakings, in the Associate Membership Examination, 1939, of the Institute of Transport, held last April at London, Belfast, Birmingham, Bristol, Glasgow, Leeds, Manchester, Swindon, Buenos Aires, Calcutta, Mariquita (Colombia), Nairobi, Rangoon, Sydney, Cape Town, Durban, and Johannesburg.

Parts I and II

Class I

Allsopp, G. W., Great Western Railway; Boswell, W. S. C., London Passenger Transport Board; Dennett, V. F., London Passenger Transport Board; Flemming, J. P., Manchester Ship Canal; Gibbs, W. A., South African Railways & Harbours; Kerr, D., London Passenger Transport Board; Quekett, D. A. F., L.M.S.R.; Sampson, J. R., L.M.S.R.; Singh, C., Kenya & Uganda Railways & Harbours.

Class III

Axford, L. T., G.W.R.; Bathurst, C. W., London Passenger Transport Board; Gray, J. A. K., L.M.S.R.; Haviland, D. W. L., L.M.S.R.; Hayman, W. H. E., New South Wales Government Railways; Hill, W. E., Port of Bristol Authority; Mallett, W. H., London Passenger Transport Board; Milne, J. G., L.M.S.R.; Milnes, H., L.M.S.R.; O'Leary, J., Great Southern Railways of Ireland; Shaw, L. H., Southern Railway; Thorne, H. P., London Passenger Transport Board; Williams, A. H., L.M.S.R.; Williams, E. U., South African Railways & Harbours.

Part I only

Beedie, D., Buenos Ayres Great Southern Railway; Dawson, L., Cheshire Lines Committee; Emm, S., Ministry of Transport; Gillitt, A. S., L.M.S.R.; Hankins, C., L.M.S.R.; Hartley, G. H., L.M.S.R.; Jolley, R. W., London Passenger Transport Board; Lake, S. C., L.M.S.R.; Lord, R. G., L.M.S.R.; Paton, G. L., Kenya & Uganda Railways & Harbours; Theron, P. J. H., South African Railways & Harbours; Titchener, C. H., London Passenger Transport Board; Winter, F. A., London Passenger Transport Board.

Part II only

Morris, K. D., L.M.S.R.; Pearson, H. A., L.N.E.R.

The undermentioned candidate, who also passed the Associate Membership examination, had been granted exemption in some subjects: Gunawardhana, H. R., Ceylon Government Railway.

From *The London Gazette* of June 23: Regular Army Supplementary Reserve of Officers, Corps of Royal Engineers, Transportation: to be Second Lieutenants (June 23):—

I. F. Clinging (late Cadet, Reigate Grammar School Contgt., O.T.C.).

J. P. Metcalfe (late Cadet Under Off., Oundle School Contgt., O.T.C.).

From *The London Gazette* of June 27: Regular Army Supplementary Reserve of Officers, Corps of Royal Engineers, Transportation: Lt. R. J. Mayer from Regular Army Reserve of Officers, R.A., to be Major (June 28).

Mr. D. Rupert Phillips, J.P., Chairman of the Barry Pilotage Authority and a prominent Cardiff docksman, has received the Cross of Chevalier de la Légion d'Honneur from the President of the French Republic. Mr. Phillips is a member of the Great Western Railway Shareholders' Audit Committee.

We regret to record the death in Belgrade on June 29 of Dr. Mehmed Spaho, who had been the Jugoslav Minister of Communications since June, 1935. He was in charge of the negotiations for the purchase from German firms of railway equipment to the value of £2,000,000.

New Marine Station Opened at Calais

M. de Monzie, the French Minister for Public Works, formally opened the new Marine railway station at Calais on Saturday, June 17, in the presence of a distinguished gathering of French and English officials, invited by the French National Railways, and the Calais Chamber of Commerce.

The new station has a Customs hall 165 ft. long, and its quayside platform has been widened and lengthened to nearly 1,600 ft. The extensions of this platform beyond the station building are provided with curtain walls to protect passengers from wind and rain. This and also the island platform are covered with ferro-concrete umbrella type roofing. The old waiting hall has been lengthened by 30 m. at each end, and entirely redecorated. The hotel buffet, telegraph and currency exchange offices, library, and Customs hall are connected by a corridor 180 ft. in length overlooking the outer harbour.

In addition to loops and sidings, there are five platform roads, two on the quay side of the main building and three beyond it. Connections between the various platforms and the station buildings are all covered. A paved roadway running towards Calais Ville facilitates the loading and unloading of motorcars into and from steamers.

To protect the quay wall from foundation scour caused by the screws of increasingly powerful steamships, a steel sheet piling apron has been driven along the foot of the wall.

At the opening ceremony the Southern Railway delegation was headed by Mr. Eric Gore-Browne (Deputy Chairman), and included Messrs. R. M. T. Richards (Assistant Traffic Manager), C. Grasemann (Public Relations and Advertising Officer), R. H. Hacker (Continental Superintendent), A. M. Newbold (British Railways' Agent for France), R. G. Gangloff (Southern Railway Agent for Calais), and H. C. Wood (Assistant Divisional Marine Manager, Dover).

At the banquet which formed part of the proceedings, Mr. Gore-Browne reminded his audience of the interest which the Southern Railway always had in the service between Dover and Calais, and recalled that in 1818 regular services operated between these ports, though it was not until 1862 that the London, Chatham & Dover Railway itself carried on the service with ships bearing such celebrated names as *The Foam* and *The Scud*. At this time travellers arriving at Calais were obliged to go to Boulogne in order to get the train to Paris. It was not until 1867 that the line was built from Calais to Boulogne.

Mr. Gore-Browne went on to say that the history of the Dover—Calais crossing would not be complete if one omitted to mention the interests of the Northern Railway of France and of the S.A.G.A. He also announced that the Southern Railway had at present a new ship, more modern than any in service, on the stocks at Dumbarton, which was expected to be ready for service at the beginning of next year.

Among the representatives of the French National Railway present were M. Guinand, Chairman, and M. le Besnerais, General Manager. M. Guinand in the course of his speech referred to the development of the port of Calais. Speaking to representatives of the Southern Railway he said: "Not only do we want you to spend your holidays with us, we want you also to appreciate at their true value our fruit and vegetables. We are particularly grateful to the Southern Railway for their financial effort in establishing a train-ferry service to France through Dover."

It is interesting to note the growth in the number of passengers using the port of Calais from 27,000 in 1814 to 654,000 in the record year, 1928. In 1928, however, only 211 motorcars were transported between Dover and Calais, but the putting into service of the *Autocarrier* has considerably developed this traffic, so that in 1938 she and cargo boats between them carried no fewer than 2,931 motorcars. The improvement at Calais combined with its modern equipment will ensure the continued success of the port as the chief connecting link between France and Great Britain. Illustrations of the new station are published opposite.

XUM

The First Fatal Derailment in Jamaica

Official inquiry report attributes the primary cause to excessive speed on 5-chain curve

The report of the commission appointed by Sir Arthur F. Richards, Governor-in-Chief of Jamaica and its dependencies, to inquire into the serious derailment which occurred near Balaclava on July 30, 1938, on the Jamaica Government Railway (recorded in our issue of August 5, 1938), declares the primary cause to have been speed in excess of the 20 m.p.h. permitted limit at the spot, coupled with acceleration of a banking engine in rear, and certain conditions affecting the state of the track. Fifty-seven witnesses were examined by the commission including the chief officers of the railway. The accident was the first train accident fatal to passengers since the first railway in Jamaica was opened 94 years ago, which is certainly a remarkable record.

The train concerned was composed of the following vehicles:—

4-8-0 type locomotive No. 30,
Eight-wheel bogie tender,
2 wooden bodied baggage wagons,
1 wooden bodied passenger coach (No. 304),
1 steel bodied passenger coach (No. 515),
3 wooden bodied passenger coaches,
3 bogie wagons,
Locomotive No. 39 pushing in rear.

It was running from Kingston to Montego along a route abounding in sharp curves and steep grades. The derailment occurred just beyond a loop siding, called Oxford siding, after which there is a rising gradient and a left-hand 17 deg. 20 min., or 5 ch. (330 ft.) radius curve; at about the beginning of this the initial flange mark was found. The effects of the accident were particularly destructive. The engine stopped against the side of a cutting and the first two vehicles travelled past it to the left, incurring severe damage. The first (wooden) passenger coach was completely telescoped by the steel one immediately behind it. The next passenger coach was flung round at right angles to the track, a complete wreck, the following one overshot it and fell to the left. The remaining vehicles and banking engine did not leave the rails. Engine No. 30 was damaged but repairable, but the tender became scrap. Thirty-two persons were killed and 105 injured. It could not be ascertained definitely how many people were in the train, but the number was estimated at about 300. Speed limit boards were in existence within ¼ mile of the site, calling attention to the limit of 20 m.p.h., while the rules call for this limit to be observed over the "hill section," on which the train was running.

The speed of the train was variously estimated as 17 to 45 m.p.h.; as is usual in such cases, the trainmen asserting that it was not excessive, and passengers who had travelled frequently declaring that they had never passed the locality so rapidly before. The report says that "from the weight of evidence and the nature and result of the accident," the speed was estimated to have been about 35 m.p.h., considerably in excess of the 20 m.p.h. permitted on the section of line concerned. Such a speed, however, was probably not sufficient to cause the train engine to derail without other contributory factors. The increase in speed that occurred after the brake application, known to have been made through the Oxford siding, was due to an acceleration of the banking engine, which tended to "push the train engine off the curve." The commission also found that there were in the track "certain minor defects, though these would not have caused the derailment of a train travelling at a normal speed and under proper control."

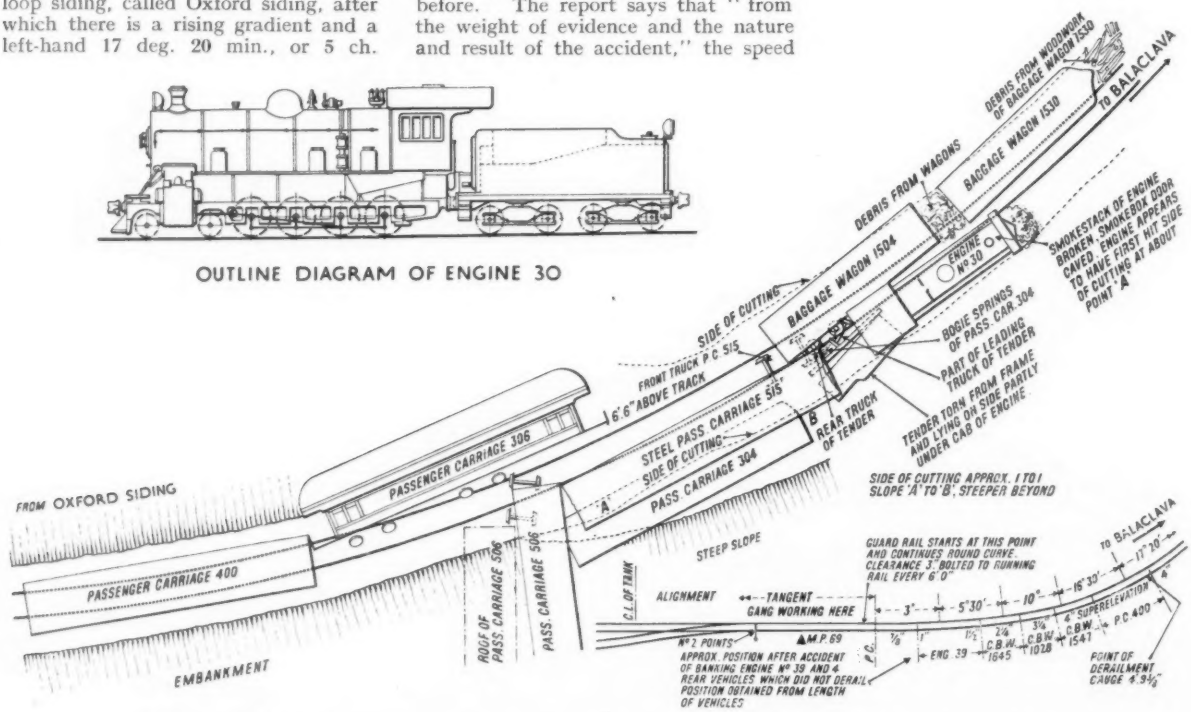
Approaching the Oxford siding, which terminates just in rear of the 69th mile post, the line falls from mile post 67⅛ at grades varying between 1 in 68·4 and 1 in 165, the latter including the siding itself. From mile posts 68½ to 69 the line is practically straight. The curve beyond, where the derailment occurred, is preceded by 230 ft. of "trackman's spiral."

The track defects referred to above are stated to have been:—

(*a*) Unevenness in two or three rail lengths after the siding points;
(*b*) An uneven rate of run-on of superelevation;
(*c*) A soft spot near the point of derailment;

The driver of the train engine was killed, but the driver of the banking engine mentioned whistle and hand signals given by his colleague. The commissioners were satisfied that the

OUTLINE DIAGRAM OF ENGINE 30

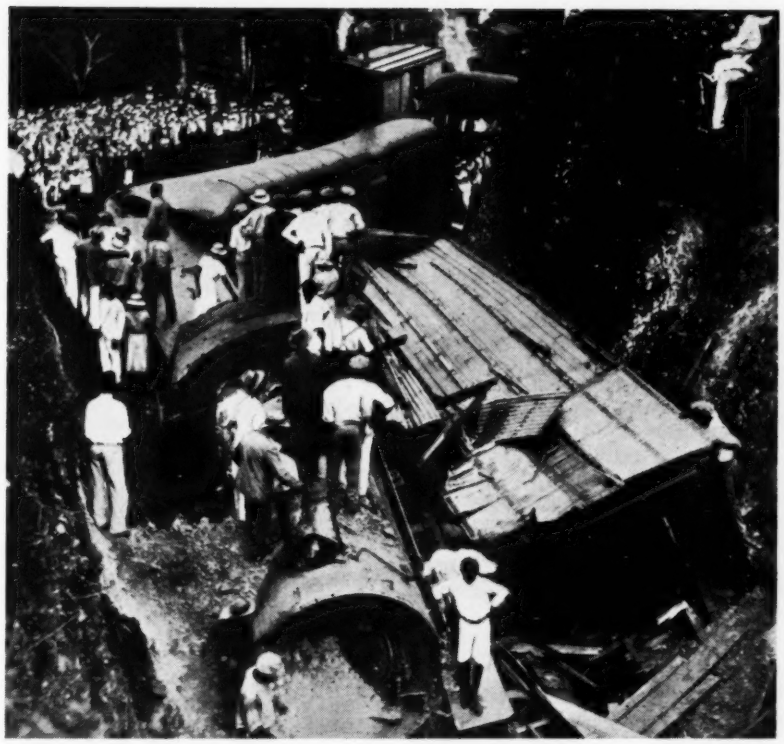

DEBRIS FROM WOODWORK OF BAGGAGE WAGON 1530
TO BALACLAVA
DEBRIS FROM WAGONS
BAGGAGE WAGON 1530
BAGGAGE WAGON 1504
ENGINE Nº 30
SMOKESTACK OF ENGINE BROKEN, SMOKEBOX DOOR CAVED, ENGINE APPEARS TO HAVE FIRST HIT SIDE OF CUTTING AT ABOUT POINT 'A'
SIDE OF CUTTING
FRONT TRUCK P.C. 515
6'6" ABOVE TRACK
BOGIE SPRINGS OF PASS. CAR. 304
PART OF LEADING TRUCK OF TENDER
STEEL PASS. CARRIAGE 515
SIDE OF CUTTING
REAR TRUCK OF TENDER
TENDER TORN FROM FRAME AND LYING ON SIDE PARTLY UNDER CAB OF ENGINE
PASS. CARRIAGE 304
FROM OXFORD SIDING
PASSENGER CARRIAGE 306
PASSENGER CARRIAGE 400
SIDE OF CUTTING APPROX. 1 TO 1 SLOPE 'A' TO 'B'; STEEPER BEYOND
STEEP SLOPE
GUARD RAIL STARTS AT THIS POINT AND CONTINUES ROUND CURVE. CLEARANCE 3" BOLTED TO RUNNING RAIL EVERY 6'0"
TO BALACLAVA
C.L. OF TANK
ALIGNMENT
TANGENT
GANG WORKING HERE
3"
5'30"
10"
16'33"
17°20'
6" SUPERELEVATION
P.C. 400
ROOF OF PASS. CARRIAGE 306
PASS. CARRIAGE 306
EMBANKMENT
Nº 2 POINTS
▲M.P. 69
APPROX. POSITION AFTER ACCIDENT OF BANKING ENGINE Nº 39 AND 4 REAR VEHICLES WHICH DID NOT DERAIL. POSITION OBTAINED FROM LENGTH OF VEHICLES
ENG. 39
C.B.W. 1645
C.B.W. 1028
C.B.W. 1547
POINT OF DERAILMENT CAUGE 4'9½"

Diagrams of the locomotive and track concerned and the wreckage in the Jamaica accident

leading driver was signalling because he found he was approaching the curve too quickly, as he gave the one short blast, which is the correct signal when calling for brakes, and that the question of taking water at the siding did not arise. Statements regarding the driver having been drunk, or incapacitated by sudden illness, were found unsupported by facts, while the possibility of a brake failure was similarly excluded.

The commissioners made a number of recommendations. They proposed that banking should be restricted to "well-defined continuous up grades." They also found that certain rules were not being observed and recommended their proper enforcement. There were "unofficial" hand signals in use, a practice both "unsatisfactory and dangerous. All necessary signals should be laid down by rule and no other signals permitted." A more distinctive "brakes" signal was recommended. "No facilities exist," it was stated, "on the Jamaica Government Railway for weighing locomotives. Although there is adequate explanation of this accident without resorting to the assumption that engine No. 30 (the train engine) was badly balanced, it is desirable that some facilities should be provided so that the weights on locomotive wheels may be maintained in accordance with their designed distribution." Speed indicators on the engines were recommended "owing to the close margin of speed permissible." The time hitherto allowed for air-brake testing at Greenvale station was also considered insufficient.

Recommendations were also made concerning the gauge at turnouts, placing men when tamping sleepers, and replacement of "trackmen's" by true spirals. Closer medical examination of drivers was also proposed, especially on resumption of duty after sick leave. The report was signed by Messrs. R. D. R. Hill, J. W. Tickell, and R. S. Grant, and is dated September 9, 1938. The derailed locomotive was constructed by Nasmyth Wilson & Co. Ltd. in 1936 and had been known to pass over many of the curves, originally of 330 ft. but later sharpened to 240 ft. radius, at over 25 m.p.h. There was nothing wrong with the engine. Banking of passenger and goods trains has now been stopped. Spirals are thought unnecessary by the management, we are informed. Whatever rules are made there must always remain the problem of securing strict obedience to them at all times.



The first fatal accident in the 94-year history of the Jamaica railways. The 4-8-0 engine shown was derailed on a 5-chain curve and before the rear banking engine could be stopped, the leading coaches were reduced to wreckage. Thirty-two persons were killed

For the photographs accompanying these notes we are indebted to Mr. H. R. Fox, General Manager and Chief Engineer to the Jamaica Government Railway.

(*See editorial comment on page 82.*)

CONFERENCE ON ENGINEERING EDUCATION AND TRAINING.—The Institution of Civil Engineers announces that a Conference on Engineering Education and Training will be held at the institution from February 6-8, 1940. Sir Clement D. M. Hindley, K.C.I.E., M.A. (President-Elect, Inst.C.E.), will be the President of the Conference and invitations to act as vice-presidents have been accepted by :—

The Rt. Hon. Lt.-Colonel John Colville, P.C., T.D., M.P., Secretary of State for Scotland; The Rt. Hon. Earl de la Warr, P.C., President of the Board of Education; The Rt. Hon. Capt. Euan Wallace, P.C., M.C., M.P., Minister of Transport; Sir William H. Bragg, O.M., K.B.E., D.Sc., D.C.L., LL.D., President, Royal Society; Sir Will Spens, K.B.E., M.A., LL.D.; The Rt. Hon. Lord Stamp of Shortlands, G.C.B., G.B.E.; The Rt. Hon. Lord Weir of Eastwood, P.C., G.C.B., D.L., LL.D.

The conference is being organised by a General Committee representative of engineering institutions, universities, technical schools and colleges, engineering consultants, industrial organisations, Government departments, and other interests. It is now nearly thirty years since a similar conference, held at the institution in 1911, was convened. Having regard to the development of scientific knowledge and the extension of the field of practical engineering, together with the growth of educational facilities, during the past quarter of a century, there is no doubt that valuable results will ensue from the forthcoming conference. It is proposed to publish a number of papers, to be circulated in advance, which will form the basis of discussion at the technical sessions of the conference. Enquiries should be addressed to the Secretary, Institution of Civil Engineers, Great George Street, London, S.W.1.

ANNUAL AUTUMN MEETING OF THE INSTITUTE OF METALS.—The thirty-first annual autumn meeting of the Institute of Metals will be held in Glasgow from September 5 to 8. In the evening of September 5 members will be welcomed by the Lord Provost of Glasgow at the conference headquarters in Glasgow—the premises of the Institution of Engineers and Shipbuilders in Scotland. After a short meeting, Mr. W. Murray Morrison, F.Inst.Met., will deliver the 17th autumn lecture on "Aluminium and Highland Water Power." On the morning of the next day seven papers will come up for discussion at the first technical session; the rest of the day will be taken up with visits to the works of three well-known Glasgow engineering firms and a civic reception at the city chambers. On September 7 a discussion on "Machinability" will be held. After luncheon more works' visits will be made, and in the same evening a dinner and dance will be arranged. Detailed programmes of the conference may be obtained from Mr. G. Shaw Scott, M.Sc., F.C.I.S., Secretary of the Institute of Metals, 4, Grosvenor Gardens, S.W.1.

RAILWAY AND OTHER REPORTS

Midland Bank Limited.—An interim dividend for the half-year ended June 30, 1939, at the rate of 8 per cent. actual, less income tax, was paid on July 15. The same rate of dividend was paid a year ago.

Manchester Ship Canal Company.—The receipts for the half year ended June 30, 1939, amounted to £688,992 as compared with £658,539 for the corresponding period of last year, an increase of £30,453. The net revenue of the whole undertaking for the half year (after providing for interest and fixed charges) was £50,352 more than for the corresponding half-year in 1938.

Entre Rios Railways Co. Ltd.—The directors have decided to pay on August 1, a further six months' arrears of interest on the 4 per cent. debenture stock, together with the 5 per cent. per annum interest on such arrears as provided for under the moratorium scheme, the total amounting to £2 3s. 8d. per cent., less income tax. The interest warrants will be posted on July 31.

International Sleeping Car Share Trust Limited.—The Wagons-Lits Company paid a dividend of 5 per cent. on its preference shares and of 2 per cent. on its ordinary shares for the year 1938. These dividends on the trust's holding of ordinary and preference shares in the Wagon-Lits Company amount, in sterling, to £8,291, which has resulted in the profit and loss account for the year to May 31, 1939, showing a net profit of £5,603, after providing for N.D.C. payable during the current year, and for income tax payable in January, 1941. After adding the credit balance at May 31, 1938, of £10,936, there is a credit balance of £16,539 which it is proposed to carry forward.

South Behar Railway Co. Ltd.—The report for the half year ended June 30 states that after paying the dividend of 2½ per cent. for the half year ended December 31 a balance remained of £4,854. With the amount received from the Secretary of State for India for the first half of 1939 and other receipts, less debenture interest, &c., there was £12,969 to the credit of revenue account. A further dividend of 2½ per cent. has been paid to stockholders; this absorbed £9,490 and left £3,479 to be carried forward. As a result of the termination of the contract with the Secretary of State for India and the consequent winding-up of the company's affairs, the debenture stock was repaid at par on July 1, 1939.

Glyn, Mills & Co.—The 110th statement of assets and liabilities as at June 30, 1939, of this well-known private banking house shows total assets of £40,207,727. To this amount £5,475,736 was contributed by coin, bank notes, and balance at the Bank of England; £3,006,594 by balances with, and cheques in course of collection on, other banks in the United Kingdom; and £9,405,121 by investments, of which £8,349,239 were in British Government securities. Money at call and at short notice totalled £8,337,050; and bank premises (at cost, less amounts written off) are valued at £620,000 freehold, and £120,000 leasehold. Cash, money at call and short notice, and investments represent 67·95 per cent. of the deposits of £34,169,953. The reserve fund stands at £530,000, and issued capital at £1,060,000.

Costa Rica Railway Co. Ltd.—The amount dealt with in the accounts for the year ended June 30, 1939, in terms of the agreement for the working of the company's railway by the Northern Railway Company is £137,100. Adding interest, &c., gives a total of £152,661. Deducting from this sum £108,853 for debenture interest, administration expenses, income tax reserve, N.D.C., Costa Rica Government tax, mortgage redemption payments, &c., there is a net profit for the year of £43,808, which, added to £10,340 brought forward, gives a total of £54,148. The directors recommend a dividend of 2 per cent., less tax, on the capital stock, requiring £36,000, and the transfer of £8,000 to investment reserve, leaving £10,148 to be carried forward.

Egyptian Delta Light Railways Limited.—Gross receipts for the year ended March 31, 1939, amounted to £218,272, against £228,908 for the previous year. Expenditure was reduced from £197,340 to £193,594, with an operating ratio of 88·69 per cent. against 86·21 per cent., leaving a balance to net revenue account of £24,678 compared with £31,568. As already announced, no payment is being made on the preference shares. Passenger traffic receipts fell from £141,622 to £135,908 although the number of passengers rose from 14,360,132 to 14,418,025. Goods traffic receipts were £78,424 against £83,271, and the tonnage lifted was 606,887 compared with 638,476. The entire bus services of the company are now being worked through subsidiary companies, and the amount accruing to the company from those services was £6,470 compared with £4,054 for 1937-38.

Edgar Allen & Co. Ltd.—Accounts for the year ended March 31, 1939, show, after deducting £46,000 for taxation and making provision for A.R.P. expenditure, a credit balance of £80,315, which, with £34,269 brought forward, makes a total of £114,584. Preference dividends take £10,875. The directors recommend a dividend for the year on the ordinary shares of 12½ per cent., less tax, requiring £26,036, the transfer of £35,000 to general reserve account, and of £5,000 to staff pension fund, leaving £37,673 to be carried forward. It is stated in the report that the volume of business has been well maintained and trading profits have increased. Substantial additions have been effected in buildings and equipment. Adequate provision for depreciation has been made out of revenue.

Gloucester Railway Carriage & Wagon Co. Ltd.—The directors propose a final dividend of 10 per cent., making 15 per cent. for the year ended May 31, 1939. For the previous twelve months the dividend was 3 per cent.

John Baker & Bessemer Limited.—It is announced that warrants will be posted on July 31 for the dividend on the 6 per cent. cumulative preference shares for the half-year ended June 30, 1939.

New Southern Electric Poster

Electrification into the Medway valley is announced on Southern Railway posters with what is becoming a familiar formula. "Now to Rochester, Chatham, Gillingham, and Maidstone by Southern Electric" we read, recalling what a short time ago it was that similar words appeared in respect of Ascot, Reading, and Camberley. A standard design by Leslie Carr illustrates announcements of the new services. In a horizontal version it shows the leading coaches of one of the

new trains with alternating round-cornered and rectangular windows, while the upright poster (reproduced) takes in only the front end of the leading motor coach. The artist has made a successful essay in conveying the impression of speed without the aid of steam and smoke that would have been furnished by a steam train. And the unusual dark tints chosen for the sky and the permanent way blend with the familiar Southern green of the rolling stock to form an attractive whole.

RAILWAY AND OTHER MEETINGS

Bombay, Baroda & Central India Railway Company

The annual general meeting of the Bombay, Baroda & Central India Railway Company was held at Southern House, Cannon Street, London, E.C.4, on July 20, Major A. D. G. Shelley, R.E., Chairman of the company, presiding.

The Secretary (Mr. N. Lincoln) read the notice convening the meeting.

In moving the adoption of the report and accounts, the Chairman said that the total length of the lines worked by the company remained at 3,509 miles. Capital expenditure for the year amounted to about 14½ lakhs of rupees. This showed an apparent increase of about 4 lakhs as compared with 1937-38, but the figure for that year was reduced by non-recurring credits, and the actual capital outlay for the year under review showed, therefore, a reduction of two or three lakhs.

Gross earnings came to 11 crores 88½ lakhs, a reduction of about 8½ lakhs on the previous year's figure. It was the first time since 1932 that their gross earnings had failed to show an increase; the reason was the decrease of 12½ lakhs as compared with 1937-38 in the metre-gauge goods earnings. A fall in working expenses had offset the reduction in their takings, and net earnings at 545 lakhs showed an increase as compared with 1937-38 of 4¼ lakhs, the percentage of working expenses to gross earnings falling from 54·81 to 54·13. The general result of the year's working was that the usual dividend of 6 per cent. could be paid, and a further addition made to their reserve funds. Earnings for the current year up to date fell short of those realised during the corresponding period of 1937-38 by about 9½ lakhs, or 2¾ per cent., both passenger and goods traffic showing disappointing results. They were, however, making every effort to increase their earnings by means of publicity, canvassing, the quotation of special rates and fares, and so on. It was hoped that the Act for the control of road traffic, passed by the Government of India last February, would do away with uneconomical competition and make road-rail co-operation easier. The Chairman said he saw no reason why they should not continue to be able to pay a 6 per cent. dividend.

Because of increased prices it had been decided not to carry out the purchase, contemplated last year, of two diesel railcar units; their technical staff was considering as an alternative the construction of a cheap railcar in the company's Ajmer shops. During the past year they had been able to obtain orders from other lines for the building of eleven locomotives in the Ajmer shops, and more orders were expected. This had meant that they had been able to restore full-time working in the shops.

The Chairman then said that they would be asked to pass a resolution authorising the board to grant Mr. G. C. Laughton, Agent and General Manager, an entertainment allowance of not more than £500 a year from funds. Mr. Laughton had joined the company in April, 1938, on a salary of Rs. 3,500 a month; he had previously been employed as a Senior Government Inspector. A newcomer to Bombay, he was put to much extra expense in order to keep up his position there as head of a large railway. The Government, which had lent him to the company, would not allow him to retire and receive, in addition to his pay as Agent and General Manager, his full pension. In those circumstances the board felt that the company should bear entirely the cost of an entertainment allowance of £500 a year to Mr. Laughton.

The report and accounts were adopted, and a resolution sanctioning the entertainment allowance to Mr. Laughton was carried unanimously. Major A. D. G. Shelley, R.E., and Mr. A. R. Barrand were elected directors and Mr. H. McClintock Harris an auditor of the company

The report and accounts were unanimously adopted.

Engineering Meetings in Argentina

The inaugural meeting of the 1939 session of the South American Centre of the Institution of Mechanical Engineers was held in Buenos Aires on June 5, at which Messrs. E. C. Noble and R. H. Parker presented a joint paper on "Caprotti valve gear as applied to locomotives." The authors recalled that the Caprotti valve gear was invented in 1921 by the Italian engineer whose name it bore, and in the same year the first engine fitted with it was put into service on the Italian railways. Since that time it had been widely adopted by railways in different countries, due to its superiority—both theoretically and practically—over the more popular link and radial gears. The gear was well-known in Argentina, as some eight years ago the Central Argentine Railway purchased 20 express engines fitted with it. One of these lately established a South American speed record by making a run from Rosario to Buenos Aires in 2 hr. 49 min., an average speed of slightly over 100 km.p.h. Recently, four large 4-8-0 type mixed traffic locomotives, fitted with this gear, had been purchased by the B.A.G.S. Railway. Among the advantages claimed for this gear, the authors of the paper enumerated a high degree of standardisation with complete interchangeability; no wear on components over long periods, as all parts work in oil baths; fuel and oil economy, and minimum maintenance costs. The lecture was illustrated with lantern slides. Mr. W. F. Nixon, Chairman of the centre, presided.

A meeting of the Buenos Aires branch of the Institution of Electrical Engineers was held on June 16, at which Mr. R. J. Musto, A.M.I.E.E., delivered a lecture on "Some technical aspects of electric arc welding." Mr. W. E. Tremain, Chairman of the branch, presided. The lecturer stated that although electric arc welding had been used experimentally in 1885, and commercially since 1910, it was only since the war that its use had been extended intensively, invading all branches of engineering such as shipbuilding, civil, structural, and mechanical engineering industries, for the construction of boilers and pressure vessels, railway carriages, motorcar bodies, and in general aircraft construction. The application of electric arc welding, Mr. Musto stated, was extending so rapidly throughout the world that the process was bound to become the preponderant method of construction within the next few decades. The lecture was illustrated by lantern slides and a film taken during the construction of a 1,600-ton, all-welded, oil-carrying vessel, to demonstrate the methods of welding used in the shipbuilding industry.

Exports of Railway Material from the U.K. in June

	June, 1939	June, 1938	Six Months Ending June, 1939	Six Months Ending June, 1938
	£	£	£	£
Locomotives, rail	198,727	154,043	816,155	763,983
Carriages and wagons	145,217	325,393	908,021	1,557,173
Rails, steel	75,752	79,463	389,302	706,517
Wheels, sleepers, fishplates and miscellaneous materials	126,280	204,588	857,369	1,085,956

Locomotive and rail exports included the following :—

	Locomotives June, 1939	Locomotives June, 1938	Rails June, 1939	Rails June, 1938
	£	£	£	£
Argentina	12,358	15,772	1,655	8,730
Union of South Africa	—*	—*	3,248	13,207
British India	15,361	7,755	17,176	15,992

* Figures not available

QUESTIONS IN PARLIAMENT

Facilities Between Glasgow and Innellan

Mr. Robert Gibson (Greenock—Lab.), on July 12, asked the Minister of Transport if he was aware that there was serious complaint of lack of travelling facilities between Glasgow and Innellan during the summer months, particularly by persons residing in Innellan whose occupations were in Glasgow and neighbourhood; and if he would make the appropriate representations to secure better transport facilities.

Captain Euan Wallace (Minister of Transport): I am not aware of any such complaint. If the hon. and learned member will give me evidence of any lack of facilities I will look into the matter.

Dukinfield Railway Wagon Works

Mr. H. B. Trevor Cox (Stalybridge and Hyde—C.), on July 14, asked the Minister of Transport whether he was aware that during the past few months almost the entire staff of the Dukinfield wagon works coach shop, new and repair, had been dismissed, and the works closed down; and whether the railway company's policy in that respect had been changed since June 8 this year.

Captain Euan Wallace (Minister of Transport): I understand that, under a scheme for the centralisation of its workshops, the company is reorganising its arrangements for the repair of carriages now carried out at Doncaster, York, and Dukinfield. About 200 men at Dukinfield have been discharged, but employment will become available at York for between 350 and 400 additional men. The company has a surplus of wagons and its requirements for new wagons are restricted to one or two special types. No new wagon construction will therefore be undertaken at Dukinfield. The forge and smithy will however be retained, and wagon repair work will be continued, certain of the carriage shops being used for this purpose. There has been no change in the company's policy since June 8 of this year.

Egyptian State Railways Order

Mr. Rostron Duckworth (Manchester, Moss Side—C.) asked the Secretary to the Overseas Trade Dept. whether he had any information as to the price of the locomotives and tenders which had been ordered by the Egyptian State railways from Poland; whether there was any British tender; and, if so, how the latter compared with the Polish tender.

Mr. R. S. Hudson (Secretary to the Overseas Trade Dept.), in a written reply, stated: I understand that the price of the locomotives and tenders ordered by the Egyptian State railways from Poland to which my hon. friend refers was £E.7,580 a unit. British firms quoted for this business, but their prices were higher.

L.N.E.R. Electrification

Mr. J. Parker (Essex, Romford—Lab.), on July 18, asked the Minister of Transport what progress had been made with the electrification of the line from Liverpool Street to Shenfield; and when it was likely to be in operation.

Mr. R. H. Bernays (Parliamentary Secretary to the Ministry of Transport): I am informed by the L.N.E.R. that it is working to schedule on this line, and keeping to this schedule. It is hoped that the new services will be introduced early in 1941.

Central London Line Extension

Mr. J. Parker (Essex, Romford—Lab.), on July 18, asked the Minister of Transport what progress had been made with the extension of the Central London Line to Stratford and Newbury Park; and when it was likely to be open.

Mr. Bernays: I am informed by the London Passenger Transport Board that of the 19½ miles of single track forming the extension of the Central London Line from Liverpool Street to Newbury Park, 15 miles have been completed apart from equipment. The board proposes to open the extension in two sections in conjunction with the electrification of the existing lines of the L.N.E.R., as follow:—

(*a*) to Loughton and Grange Hill *via* Woodford Junction in April, 1940;

(*b*) to Grange Hill *via* Newbury Park and to Epping and Ongar later in 1940.

Rishton Station Platform

Major H. A. Procter (Accrington—C.), on July 19, asked the Minister of Transport if he was aware that the platform of the Rishton railway station was so low as to be a danger to passengers and, in spite of requests by the Rishton Urban District Council, the railway company refused to take any action at the present time; and whether he would take steps to compel the railway company to make the platform safe.

Captain Euan Wallace (Minister of Transport): The railway company states that it has under active consideration a scheme for raising the height of the platform to 3 ft. and for extending both platforms.

L.M.S. Ferry Service between Gourock and Dunoon

Mr. Robert Gibson (Greenock—Lab.), on July 19, asked the Minister of Transport whether he was aware that negotiations were proceeding with a view to establishing a ferry service for motor vehicles between Gourock and Dunoon; what structural alterations were required in connection therewith in the piers at each terminus, and the probable cost thereof; and whether he would take the appropriate steps to expedite the initiation of this service for the purpose of making Argyllshire readily accessible to motor users in Greenock and neighbourhood.

Captain Euan Wallace: I am informed by the L.M.S.R. that negotiations initiated by the company are proceeding with a view to establishing a ferry service for motor vehicles between Gourock and Dunoon, which will involve the preparation of a specially designed ferryboat to enable cars to be handled at all states of the tide. Ramps will be required at each terminal and the question of cost is under examination. The negotiations are being directed with a view to having the service in operation at the earliest possible date.

Jersey Marine Bridge

Sir William Jenkins (Neath—Lab.), on July 19, asked the Minister of Transport what action he was taking to get the Jersey Marine bridge erected; was he aware of the dangerous position of the present structure, and that the matter had been under consideration for a number of years.

Captain Euan Wallace: I am aware of the unsatisfactory condition of the Jersey Marine bridge. Negotiations between the Glamorgan County Council and the G.W.R. were recently interrupted by a request for the modification of the alignment of the approach roads to avoid interference with a civil aerodrome in process of development. An amended line has been agreed and I understand that the County Council is now in a position to complete arrangements with the company for the construction of a new bridge.

Gold Coast Railway Strike

Mr. R. W. Sorensen (West Leyton—Lab.), on July 19, asked the Secretary of State for the Colonies whether he was aware that the temporary settlement of the recent strike of railway artisans and workmen connected with the Gold Coast Railway has left these men with extremely inadequate wages and other grievances; and, in view of the discontent that prevailed in this respect, what action he proposed to take to remove these grievances, and thus minimise the likelihood of another strike.

Mr. Malcolm MacDonald (Secretary of State for the Colonies): The wages grievance on which the men struck was completely met, and the strike ended, when they were assured that the 1929 rates of pay would be restored. Certain other concessions were also made, and I am informed that the only important grievance now outstanding is the question of an increase in the number of pensionable posts. That question is receiving attention.

Cymmer Bridge

Sir William Jenkins (Neath—Lab.), on July 19, asked the Minister of Transport if he would enquire into the unsatisfactory and dangerous condition of the bridge belonging jointly to the Glyncorrwg Urban District Council and the Great Western Railway, at Cymmer, and ascertain when the new bridge

would be erected, as it is now a source of public danger.

Captain Euan Wallace: The improvement of this bridge was included in a programme of works which the Glamorgan County Council proposed to put in hand in the year 1936, and it was then informed that a grant of 75 per cent. of the net cost of an approved scheme would be made from the Road Fund. I understand that the matter has been deferred pending consideration of a scheme of diversion which would render expenditure on the existing bridge unnecessary.

Parliamentary Notes

Southern Railway Act

The Royal Assent was given on July 13 to the Southern Railway Act, 1939

London Transport Bill

This Bill was, on July 18, ordered by the House of Lords Unopposed Bills Committee to proceed for third reading. As an opposed Bill, it was originally intended that it should be considered on July 18 by a Select Committee, but the last minute withdrawal of the objections made this unnecessary. The Bill empowers the board to provide certain services of trolley buses, construct new works, acquire lands, and raise additional money.

Netherlands Centenary Exhibition

An exhibition in celebration of the centenary of the Netherlands Railways is to be opened at Amsterdam on September 8 next, and the preparations for it are now in full swing. The station from which the first Dutch train started, is already in place on the ground, situated in the heart of the city. Signals of the year 1839 are being made, to be used in conjunction with the train which, built according to old drawings, is to run on a 2-m. track—actually 1·95 m. (approximately 6 ft. 4½ in.)—round the exhibition. The great hall is to cover 3,500 sq. m. Every inducement to visit the exhibition is to be made. The whole of the railway staff with their relatives—including pensioners and their womenfolk—will be conveyed there free in special trains; similar trains will be put on for the public. Every Wednesday there will be special return tickets issued at all stations at 80 per cent. reduction, with special rates for parties and schools.

Forthcoming Events

Aug. 18-20.—Institution of Railway Signal Engineers, at Nottingham. Summer Meeting.

Aug. 19 (*Sat.*).—Stephenson Locomotive Society (London), 10 a.m. Visit to Crewe Works, L.M.S.R.

Aug. 26 (*Sat.*).—Institutions of Civil and Mechanical Engineers. Visit to United States and Canada.

The Railway Position in Ceylon

(*From our special correspondent*)

It is understood that the Acting General Manager of Railways, Mr. W. G. Hills, has reported to the Ministry of Communications and Works that the railway is faced with a further loss amounting to Rs.2,115,000 on its working during the present financial year. This loss is in addition to that already provided for in the budget for the present financial year, amounting to Rs.2,715,421. The total estimated loss on the working during the present financial year will, therefore, be Rs.4,830,421. The shortfall of revenue now reported is attributed to the distress in the rural areas consequent on the drought and the malarial epidemic.

The Ministry of Communications and Works has recommended that a supplementary vote be introduced in the State Council for meeting this additional loss.

Besides the loss of Rs.2,715,421 which has already been provided for from revenue in the estimates for the present financial year, there are two other large sums for which no credit was taken in the general revenue estimates, as there was no prospect of the railway paying those sums to revenue. These were Rs.86,495 interest payable to revenue on advances to the railway, and Rs.3,650,231 representing annuities payable to revenue on loans to the railway.

Though there was an increase in passenger traffic last year after the introduction of lower fares and other travel facilities, the drought and the consequent malaria epidemic leading to the impoverishment of the rural population, it is pointed out, has brought about a setback to the improvement of the railway finances.

The Acting General Manager of Railways also points out that although the Transport Commission issued its report in 1937, nothing has yet been done to co-ordinate road and rail transport.

Retrenchment Measures

The recommendations of the Retrenchment Commission on the working of the Ceylon Railway Department are calculated to effect an annual saving of Rs. 1,294,518. These savings are in addition to the retrenchment measures recommended by the sub-committee of the Advisory Committee appointed to consider the recommendations of the Transport Commission. The sub-committee recommended measures which would have effected an annual saving of Rs. 1,926,999, but the figure was later reduced by the Ministry of Communications and Works to Rs. 1,869,604. The following are the principal savings now recommended by the Retrenchment Commission:—

General Manager's Office: Rs. 8,492; Way and Works Department: Rs. 350,569; Mechanical Engineer's Department: Rs. 178,360; Transportation Department: Rs. 501,435; Chief Accountant's Branch: Rs. 100,562; Railway Storekeeper's Establishment: Rs. 155,000.

The new General Manager of Railways is expected to be appointed in the course of three months, and the Treasury, to which the appointments to the posts of Superintendent Organisation and Staff and Commercial Superintendent has been referred, has postponed the consideration of the acting General Manager's proposals on the subject until the appointment of the new General Manager, or for a period of three months, whichever is earlier.

The Retrenchment Commission draws attention to the heavy expenditure, amounting to Rs. 1,933,700, in the last financial year, on what are called Railway Flying Squads and proposes to cut down this figure.

Suggested Closing of the Kandy-Matale Section

Mr. Hills, in the course of an address at the Matale Planters' Association, said he was opposed to the closing down of the Kandy—Matale section of the railway. The freight figures between Matale and Kandy taken by themselves certainly showed a loss, but if the entire return brought to the railway on the through traffic was taken into consideration, it justified keeping the section open. If the Matale—Kandy section was closed, most of the traffic that now went by rail from Matale to Kandy, and through to Colombo, would go direct by road. He did not think many estates would send traffic by lorry to Kandy, there to be transferred to the railway.

Mr. Hills announced that, to effect the greatest possible economy, the passenger service of the section would be worked entirely by the railcars now on order in England; goods traffic would be confined to one train each way daily; and station staff would be reduced. The railcars would, moreover, give a better and more frequent service to the public.

ARGENTINE RAILWAY EARNINGS.—The gross earnings of the privately-owned Argentine railways for the first nine months (July-March) of the financial year 1938-39, amounted to 300,704,000 pesos m/n., a decrease of 9,739,000 pesos, or 3·1 per cent., compared with the corresponding period of the previous financial year. The receipts of the British-owned railways, included in the above total, were 271,242,000 pesos, and were 9,568,000 pesos, or 3·4 per cent. less. Of the aggregate, goods traffic was 5,703,000 pesos, or 2·8 per cent. down, and passenger traffic was 2,843,000 pesos less, or 4·1 per cent., although the number of passenger journeys was higher by 3·6 per cent.

NOTES AND NEWS

Mussolini Station in Berlin.—Messages from Munich report that Herr Hitler has announced that in future the Heerstrasse Bahnhof in Berlin will be known as the Mussolini Bahnhof.

Polish Railcar Collision.—On July 16 two railcar trains collided on the Warsaw-Vilanor line of the Polish State Railways. It is reported that the cars caught fire and that nine persons were killed and over 150 injured.

Opening of the Albert Canal.—The official opening of the Albert Canal by H.M. King Leopold III of the Belgians remains fixed for July 30. This ceremony will be marked by numerous festivities. International regattas will be held from July 31 to August 4.

Accident to Roumanian Troop Train.—Reports reaching Bucharest state that a passenger train and a troop train collided head-on on the night of July 10-11 at Ileanda Mare, 50 miles north of Cluj, Transylvania. Messages which have been allowed to be published state that two persons were killed and 20 seriously injured.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the month of May, 1939, amounted to $11,994,000, an increase of $1,431,000 in comparison with May, 1938. Working expenses were $10,087,000, or $54,000 lower, leaving net earnings $1,485,000 higher at $1,907,000. For the first five months of 1939 gross earnings were $51,453,000, an increase of $310,000 in comparison with the first five months of 1938, and the net earnings of $4,288,000 showed an advance of $2,118,000.

Canadian National Earnings.—The May, 1939, gross earnings of the Canadian National Railways were $16,842,266, an increase of $2,932,588 in comparison with May, 1938. Operating expenses amounted to $15,369,232, with an increase of $980,941, resulting in net earnings which were an improvement of $1,951,647 on May, 1938. Aggregate gross earnings for the first five months of 1939 amounted to $72,492,009, an increase of $3,434,694 in comparison with the first five months of 1938, and the deficit on working was $493,321, or $4,416,079 lower.

Collision on Argentine State Railways.—On June 7 a serious collision occurred on the Cordoba Central section of the State Railways near Boulogne station, 21 km. from Buenos Aires. A diesel train, composed of two articulated coaches, travelling at about 80 km.p.h., was for some unexplained reason diverted into a siding, where it crashed into a stationary goods train. Sixteen persons were injured, including the driver of the diesel train, who later died in hospital. The accident is believed to have been partly due to a thick fog which prevented the driver of the passenger train from seeing that the signals were against him.

Argentine State Railways Locomotives to Burn Oil.—The Argentine State Railways administration is—according to the *Anglo-Argentine Review*—to spend over $1,000,000 on the conversion of its locomotives from coal to oil burning, and on improvements to its equipment generally, and on bridges and culverts.

New Halt at Upton-By-Chester.—A new halt at Upton-by-Chester, between Chester and Mollington on the Chester-Birkenhead L.M.S. & G.W. Joint line, was opened for passenger traffic on July 17. For parcels traffic, there has been an extension of the Chester cartage boundary, so that parcels for addresses in the Upton area are conveyed by the Chester parcels vehicles.

Fire Dislocates Southern Railway Services.—A fire which broke out late on July 19 in a warehouse in Borough Market spread to the adjacent Southern Railway lines leading from Borough Market junction, just west of London Bridge, to Cannon Street station. The current was cut off and all services between those points were cancelled and Cannon Street station was closed. Some of the traffic was diverted to Charing Cross, and passengers were advised to use other routes.

Transport for Army Manœuvres.—In connection with the army manœuvres which are to take place between September 15 and 23, the railway companies are arranging to run special trains for the troops and equipment involved, including the First and Second Divisions, various units of G.H.Q. and Corps troops, supplementary reserve units, 70th and 74th Field Regiments, T.A., and their signal sections, and the 51st and 52nd Light Anti-Aircraft Regiments, T.A., and their signal sections. Supplies of petrol, ammunition, and food will be transported by train.

Road Accidents.—The Ministry of Transport return for June of persons killed or injured in road accidents is as below. The figures in brackets are those for the corresponding period of last year :—

	Killed		Injured	
England—				
Pedestrians...	159	(163)	4,787	(4,967)
Others ...	271	(290)	13,236	(13,232)
Wales—				
Pedestrians...	5	(11)	204	(229)
Others ...	9	(12)	515	(565)
Scotland—				
Pedestrians...	22	(24)	654	(703)
Others ...	26	(36)	1,223	(1,092)
	492	(536)	20,619	(20,788)

Public Refuse to Allow Newfoundland Railway to be Taken Up.—Five hundred men, following a leader carrying a Union Jack, rebelled on July 4 when the Newfoundland Government tried to tear up the branch railway between Whitbourne and Heart's Content because it was being worked at a loss. Residents of the region warned the railway workers not to try to remove the rails, and telegraphed to Government Officials, promising serious trouble if dismantling was undertaken. The Government, accordingly, ordered the railwaymen to abandon work.

London Transport Stock (Amendment) Regulations.—The Minister of Transport has made the London Transport Stock (Amendment) Regulations, dated June 5, 1939, modifying the London Transport Stock Regulations, 1933 ("the Principal Regulations"), so that the Principal Regulations shall have effect as though in (i) the definition of registered stock in Regulation 2 thereof; (ii) Regulation 29 thereof, and (iii) paragraph (1) of Regulation 34 thereof the words "instrument in writing" were substituted for the word "deed."

Slovak-Polish Frontier.—It is reported from Bratislava (Pressburg) that within the next few days the Slovak-Polish frontier commission will meet there to determine the Slovak-Polish frontier. It will be concerned particularly with the territory near the city of Cadca, in northern Slovakia. A short time ago, Poland occupied the strategically important railway line near that city, and at present Polish troops are in possession there of part of the three Slovak districts of Skalite, Cierne, and Svrsinovec. In the case of Skalite, the present provisional boundary cuts through the middle of the town.

Schafberg Rack Railway Taken Over by Reichsbahn.—Since the closing of the Austrian tourist bureau, the rack railway, 7·5 km. long, from St. Wolfgang up the Schafberg, with the hotel at the summit and the 3 motor vessels plying on the Wolfgang lake, have been taken over by the German State Railway, with effect back dated from January 1, 1938. For some years past these undertakings had not been doing well, but since the *Anschluss* there has been a very considerable increase in traffic and visitors to the district from the other parts of the Reich, and prospects are favourable. It is expected that in due course the working of the hotel will be leased, in accordance with the general practice.

North Sunderland Railway.—It was recently stated officially that the North Sunderland Light Railway from Chathill to Seahouses is not to be taken over by the London & North Eastern Railway Company, notwithstanding negotiations with such a transfer in view. The L.N.E.R. Company feels that it is not justified in incurring the expenditure of converting the track to the heavier standard necessary and of buying new rolling stock, but is willing to give the Sunderland Company what help it can. The North Sunderland Railway Company was incorporated by Special Act on June 27, 1892, and in 1898 obtained an Order

under the Light Railways Act, enabling it to be worked as a light railway. The line was opened to traffic on August 1, 1895. Its length is 4 miles 6 chains single line, standard gauge, and the working stock consists of 1 steam locomotive, 1 diesel-electric locomotive, and 3 carriages. The issued capital is £24,820 in 1,490 ordinary and 992 preference shares of £10. No dividend has yet been paid on either class of shares. Last year gross receipts amounted to £1,568 and expenditure was £1,628. For traffic the railway is dependent chiefly on summer holiday makers.

Victorian Railways Posters.—From the Publicity Department of the Victorian Railways we have received some tastefully-designed posters brought out to advertise "Winter Sunshine" resorts served by the administration. Victoria contains some of the most beautiful and varied scenery, both inland and coastal, in Australia. One poster shows a girl skier against a snow-clad mountain background representing one of the peaks of the Great Dividing Range. Mildura, in the fertile Murray Valley, is another subject, and the remaining posters advertise the Mornington Peninsula—a holiday district within easy access of Melbourne—and Healesville, a pleasant resort situated in hilly country. Like many of their predecessors advertising holiday centres, these Victorian Railways posters carry the slogan of a well-known firm of photographic manufacturers.

Report of Eire Transport Tribunal—The report of the Transport Tribunal is likely to be presented to the Minister of Industry and Commerce within the next four weeks. As the sessions of the tribunal were not public, any forecast of its findings is premature and must be conjecture, but seeing that it was set up with the express intention of affording relief to the railways, the report is awaited with optimistic expectation by the managements and staffs, as it is expected that some satisfactory solution to their problems must be forthcoming.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 28th Week			Totals to Date		
	1939	1938	Inc. or Dec.	1939	1938	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,828 mls.)						
Passenger-train traffic...	697,000	721,000	– 24,000	13,373,000	13,577,000	– 204,000
Merchandise, &c. ...	513,000	426,000	+ 87,000	13,159,000	12,992,000	+ 167,000
Coal and coke ...	240,000	222,000	+ 18,000	7,541,000	7,221,000	+ 320,000
Goods-train traffic ...	753,000	648,000	+ 105,000	20,700,000	20,213,000	+ 487,000
Total receipts	1,450,000	1,369,000	+ 81,000	34,073,000	33,790,000	+ 283,000
L.N.E.R. (6,320 mls.)						
Passenger-train traffic...	454,000	456,000	– 2,000	8,663,000	8,752,000	– 89,000
Merchandise, &c. ...	329,000	295,000	+ 34,000	8,995,000	9,126,000	– 131,000
Coal and coke ...	241,000	196,000	+ 45,000	7,135,000	6,769,000	+ 366,000
Goods-train traffic ...	570,000	491,000	+ 79,000	16,130,000	15,985,000	+ 235,000
Total receipts	1,024,000	947,000	+ 77,000	24,793,000	24,647,000	+ 146,000
G.W.R. (3,737¾ mls.)						
Passenger-train traffic...	291,000	295,000	– 4,000	5,609,000	5,626,000	– 17,000
Merchandise, &c. ...	215,000	177,000	+ 38,000	5,601,000	5,278,000	+ 323,000
Coal and coke ...	115,000	101,000	+ 14,000	3,180,000	3,082,000	+ 98,000
Goods-train traffic ...	330,000	278,000	+ 52,000	8,781,000	8,360,000	+ 421,000
Total receipts	621,000	573,000	+ 48,000	14,390,000	13,986,000	+ 404,000
S.R. (2,142 mls.)						
Passenger-train traffic...	420,000	411,000	+ 9,000	8,651,000	8,613,000	+ 38,000
Merchandise, &c. ...	66,000	58,500	+ 7,500	1,708,500	1,701,500	+ 7,000
Coal and coke ...	29,000	30,500	– 1,500	899,500	861,500	+ 38,000
Goods-train traffic ...	95,000	89,000	+ 6,000	2,608,000	2,563,000	+ 45,000
Total receipts	515,000	500,000	+ 15,000	11,259,000	11,176,000	+ 83,000
Liverpool Overhead ... (6½ mls.)	1,438	1,403	+ 35	39,055	37,981	+ 1,074
Mersey (4½ mls.) ...	4,176	4,078	+ 98	124,740	121,552	+ 3,188
*London Passenger Transport Board ...	595,000	566,500	+ 28,500	1,192,300	1,136,100	+ 56,200
IRELAND						
Belfast & C.D. pass. (80 mls.)	7,239	7,071	+ 168	65,313	62,622	+ 2,691
,, ,, goods	328	323	+ 5	11,981	11,935	+ 46
,, ,, total	7,567	7,394	+ 173	77,294	74,557	+ 2,737
Great Northern pass. (543 mls.)	20,000	19,000	+ 1,000	282,000	272,200	+ 9,800
,, ,, goods	8,850	9,000	– 150	281,150	244,600	+ 36,550
,, ,, total	28,850	28,000	+ 850	563,150	516,800	+ 46,350
Great Southern pass. (2,076 mls.)	45,133	47,876	– 2,743	925,890	918,516	+ 7,374
,, ,, goods	40,339	38,299	+ 2,040	1,127,823	1,096,597	+ 31,226
,, ,, total	85,472	86,175	– 703	2,053,713	2,015,113	+ 38,600

* 2nd Week (before pooling)

British and Irish Railway Stocks and Shares

Stocks	Highest 1938	Lowest 1938	Prices July 19, 1939	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	65¼	25¾	33½	+½
5% Con. Prefce....	118¾	74	90½	—
5% Red.Pref.(1950)	111¾	90	96½	+1½
4% Deb.	111	97½	97½	+1
4½% Deb.... ...	112 5/16	100½	100	—
4½% Deb.... ...	118½	104	105	+2½
5% Deb.	131½	119	112½	—
2½% Deb.... ...	69¾	60	59	—
5% Rt. Charge ...	129	114	109½	—
5% Cons. Guar. ...	128½	103	106½	+1
L.M.S.R.				
Ord.	30½	11	14½	+½
4% Prefce. (1923)	70¼	23	43	+3
4% Prefce. ...	82¼	43¾	61½	+1½
5% Red.Pref.(1955)	103½	66	76½	—
4% Deb.	105 15/16	85	91	+½
5% Red.Deb.(1952)	114¼	105	107	—
4% Guar. ...	102¾	77½	83½	+1
L.N.E.R.				
5% Pref. Ord. ...	8 9/16	3½	4½	+⅛
Def. Ord.	4 7/16	2 1/16	2¾	+⅛
4% First Prefce.	68¼	21	34½	+2½
4% Second Prefce.	27¼	8	12½	+½
5% Red.Pref.(1955)	97	40¼	49½	+1
4% First Guar. ...	97½	66¼	73½	—
4% Second Guar.	91¼	52	65½	—
3% Deb.	79¼	60	63½	—
4% Deb.	104⅛	77	84½	—
5% Red.Deb.(1947)	110 5/8	97	103½	—
4½% Sinking Fund Red. Deb.	108 11/16	101	98	—
SOUTHERN				
Pref. Ord. ...	87	47	70½	—
Def. Ord. ...	21¾	9 1/16	15½	–½
5% Pref.	115	83	96½	+1
5% Red.Pref.(1964)	115½	98	99½	—
5% Guar. Prefce.	128½	106	110	—
5% Red.Guar.Pref. (1957)	116	108½	108½	—
4% Deb.	109¼	95	97½	+2
5% Deb.	129	117	114	—
4% Red. Deb. 1962–67	107	101½	102½	—
BELFAST & C.D.				
Ord.	4	3½	4	—
FORTH BRIDGE				
4% Deb.	102	99⅛	92½	—
4% Guar. ...	103¼	94½	89	—
G. NORTHERN (IRELAND)				
Ord.	5½	2½	3½	—
G. SOUTHERN (IRELAND)				
Ord.	25½	8½	10	—
Prefce.	35	13	12¼	—
Guar.	70¼	30 15/32	31	—
Deb.	83	56	51	—
L.P.T.B.				
4½% "A" ...	119⅝	107½	107½	—
5% "A" ...	130	117	114½	—
4½% "T.F.A." ...	108	98	102½	—
5% "B" ...	122 13/16	105	109½	—
"C"	84	68	73½	—
MERSEY				
Ord.	24¼	16½	22	—
4% Perp. Deb. ...	102⅞	94¾	90*	–1
3% Perp. Deb. ..	77	69	65½*	–1
3% Perp. Prefce.	66½	57	52½	—

* ex dividend

CONTRACTS AND TENDERS

Wagons for L.N.E.R.

The Metropolitan-Cammell Carriage & Wagon Co. Ltd. has received an order from the L.N.E.R. for 46 hopper ballast wagons.

The Birmingham Railway Carriage & Wagon Co. Ltd. has received an order from the L.N.E.R. for two ballast plough vans.

The Swiss Locomotive & Machine Works has received from the Chemin de Fer Damas-Hama et Prolongements an order for the supply of two combined rack and adhesion locomotives for the Beirut-Damascus line. The engines are of the 0-10-0 type and designed for the 1·05 metre (3 ft. 5¼ in.) gauge. Each locomotive will be equipped with two double driving rack wheels driven independently from the adhesion wheels. The five axles will be coupled and therefore the whole weight of the engine will be available for the adhesion drive.

Thos. Firth & John Brown Limited has received an order from the Buenos Ayres Great Southern Railway for 100 tyres for locomotives, carriages, and wagons.

The Bengal-Nagpur Railway Administration has placed the following orders :—

Beyer, Peacock & Co. Ltd. : Flexible steam pipes, 18 driving cranks and connecting and coupling rods.
Vulcan Foundry Limited : Frameplates and cylinders for locomotives.
Steel, Peech & Tozer : Steel crank axles and 1,065 steel tyres.
Stewarts and Lloyds Limited : Boiler and superheater flue tubes.
Superheater Co. Ltd. : Superheater elements and headers.
Thos. Firth & John Brown Limited : 352 steel locomotive tyres.
Steel Company of Scotland Limited : 2,400 Steel tyres.
Blaenavon Co. Ltd. : 2,900 Steel tyres.
Brown Bayley's Steelworks Limited : 385 Steel tyres.

Guest, Keen & Nettlefolds Limited has received an order from the Argentine North Eastern Railway for 100,000 dogspikes.

The Junagad State Railway Administration has placed the following orders to the inspection of Messrs. Robert White & Partners :—

H. J. Skelton & Co. Ltd. : 20 tons of dogspikes.
Banting & Tresilian : 19 copper firebox plates.
P. & W. MacLellan Limited : 30 tons of mild-steel sections and bars.

The South Indian Railway Administration has placed the following orders to the inspection of Messrs. Robert White & Partners :—

North British Locomotive Co. Ltd. : Walschaerts valve gear details.
Banting & Tresilian : 130 solid-drawn steel smoke tubes.
John Walsh & Co. Ltd. : Eight tons of round steel bars.

D. Wickham & Co. Ltd. has received an order from the Central Argentine Railway Administration for 16 light petrol-driven inspection trolleys.

The American Locomotive Company has received orders for three 2-8-2 type locomotives for the Green Bay & Western Railroad and for one streamlined diesel-electric locomotive for the Chicago, Rock Island & Pacific Railroad's " Rocket " services.

The Associated Equipment Co. Ltd. has received the following repeat orders from railway and railway-associated road transport operators : Mansfield & District Traction Co. Ltd., one, and Northern General Transport Co. Ltd., one, petrol-driven, and C.I.T.A., Buenos Aires, two oil-engined Regal passenger vehicles ; and the London Passenger Transport Board, two petrol-driven breakdown lorries.

The Crown Agents for the Colonies have recently placed the following orders :—

Carrier Weathermakers Limited : Air-conditioning plant.
C. Richards & Sons Ltd. : Bolts.
W. T. Henley's Telegraph Works Co. Ltd. : Cable.
Monk Bridge Iron & Steel Co. Ltd. : Carriage and wagon tyres.
Standard Telephones & Cables Limited : Carrier telephone apparatus.
Nuts & Bolts (Darlaston) Limited : Clip bolts.
Enfield Cable Works Limited : Conductor stranded copper.
T. Bolton & Sons Ltd. : Copper ingots.
I.C.I. Metals Limited : Copper ingots.
Turners Asbestos Cement Company : Corrugated sheets.
British Insulated Cables Limited : Dry core cable.
Belliss & Morcom Limited : Electric generating set.
Britannic Electric Cable & Construction Co. Ltd. : Electrical materials.
Pirelli-General Cable Works Co. Ltd. : Electrical materials.
Cargo Fleet Iron Co. Ltd. : Fishplates.
Dorman, Long & Co. Ltd. : Galvanised corrugated sheets.
Wellington Tube Works Co. Ltd. : Galvanised corrugated bends.
Brown Bayley's Steel Works Limited : Laminated bearing spring and buckles.
Albion Motors Limited : Lorry chassis.
Vauxhall Motors Limited : Lorry chassis.
Phosphor Bronze Co. Ltd. : Metal.
Whitehead Iron & Steel Co. Ltd. : Mild-steel bars.
Dorman, Long & Co. Ltd. : Mild-steel bars and steel.
P. & W. MacLellan Limited : Mild-steel plates, round steel joists, and steel.
Turners Asbestos Cement Company : Pipes.
Staveley Coal & Iron Co. Ltd. : Pipes and fittings.
Swift-Summerskill Limited : Planing machine.
Horseley Bridge & Thos. Piggott Limited : Pressed steel plates and fittings.
Lancashire Steel Corporation Limited : Rails and fishplates.
Sentinel Waggon Works (1936) Limited : Renewal of railcar boilers.
Guest, Keen & Baldwins Iron & Steel Co. Ltd. : Steel sleepers.
Wm. Bain & Co. Ltd. : Steelwork.
Siemens Bros. & Co. Ltd. : Telephone installation.
Butler Machine Tool Co. Ltd. : Traverse head shaper.
Stewarts and Lloyds Limited : Tubes.
Thos. Firth & John Brown Limited : Tyres.
W. & T. Avery Limited : Weighbridges.
J. Baker & Bessemer Limited : Wheels and axles.

Beijnes N.V., of Haarlem, has received an order from the Netherland Indian State Railways for three triple-car 600-b.h.p. diesel trains for express passenger service. Two 300-b.h.p. Thomassen engines equipped with Büchi pressure-chargers are to be installed in each train, and the transmission will be through Vulcan-Sinclair fluid couplings and S.L.M.-Winterthur gearboxes.

The Vulcan Foundry Co. Ltd. has received an order from the Gondal Railway Administration for one boiler back end for YD type locomotive, to be supplied to the inspection of Messrs. Robert White & Partners.

Tenders are invited by the Iranian Government for the supply of accessories for railway points and crossings. Specifications are obtainable from the Commercial Attaché, Imperial Iranian Legation, Ling House, 10-13, Dominion Street, London, E.C.2.

The South African Railways & Harbours Administration is calling for tenders (Tender No. 2247) for the supply and delivery of quantities of copper plates for locomotive boilers. Tenders endorsed " Tender No. 2247 Copper Plates for Locomotive Boilers " should be addressed to the Secretary to the Tender Board, Room 420, South African Railways & Harbours Headquarter Offices, Johannesburg, to be received by September 11. A copy of the schedule of quantities, specification and general conditions of tender, together with drawings, may be borrowed from the Department of Overseas Trade, London, S.W.1. Local representation is essential.

ARGENTINE RAILWAY SPEEDS.—According to figures published by the *Instituto de Estudios Economicos del Transporte* of Buenos Aires, the fastest booked run in the Argentine Republic with steam haulage is from General San Martin to La Paz, Buenos Ayres & Pacific Railway, a distance of 96·1 km. (59·7 miles), covered in 61 min., at 58·7 m.p.h. start-to-stop. The longest non-stop run in the Argentine is from Buenos Aires to Rosario, 302·9 km. (188·2 miles), and the fastest booking is at 53·8 m.p.h.

RE-SIGNALLING OF PORTSMOUTH, MID-SUSSEX, AND COASTAL LINES, SOUTHERN RAILWAY.—The Westinghouse Brake & Signal Co. Ltd., of 82, York Way, London, N.1, has issued a well-produced 16-page booklet, the text of which is taken from THE RAILWAY GAZETTE for February 24, 1939. It gives a concise general account of several interesting re-signalling schemes carried out by the Southern Railway in connection with its extension of electric services to Portsmouth and along the South Coast lines, enabling the principles adopted by that company readily to be understood, together with the leading features of the design of equipment used. The booklet is 11 in. by 8½ in., and contains 14 photographic reproductions, 3 diagrams, a map, and a folding plate of signalling layouts. The folding plate, also reproduced from our pages, shows typical installations at and near Havant station and at Bognor terminus, from which the practice of the Southern Railway in this class of work can be fully understood.

OFFICIAL NOTICES

Crown Agents for the Colonies

COLONIAL GOVERNMENT APPOINTMENTS

APPLICATIONS from qualified candidates are invited for the following post:—

ASSISTANT ENGINEER

required by the Gold Coast Government Railway for two tours of 12 to 24 months with possible permanency. Salary £475 a year for two years then £500—£25—£600—£30—£840 a year and then subject to promotion to a vacancy by annual increments of £40 to £1,000 a year. Free passages and quarters and liberal leave on full salary. Candidates, aged 25-35, must be Corporate Members of the Institution of Civil Engineers or possess an engineering degree recognised as granting exemption from Sections A and B of the A.M.I.C.E. examination, and must have had practical experience on a British Railway. Preference will be given to candidates who have had, in addition to the above qualifications, practical experience in harbour maintenance.

Apply at once by letter, stating age, whether maried or single, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/8299.

OFFICIAL ADVERTISEMENTS

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to:—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

Higher Fares a Failure on U.S.A. Eastern Railways

A year ago, the Eastern railways raised the coach fare from 1d. to 1¼d. a mile, though the rate in the West is 1d. or less and, in the South, ¾d. The experiment was not a success, and, since the higher fares have been in effect in the East, the trend of receipts has been less favourable than in the West and South. So, on July 1, the Eastern railways reduced their rates for return journeys only, on a sliding scale varying from 1⅛d. for shorter journeys to 0·85d. for distances over 900 miles. Passenger receipts were fractionally higher in March than in that month a year before, but the corresponding bus revenues were nearly 9 per cent. above those of March, 1938. The significant point of this comparison is that practically all of the improvement in bus receipts occurred in Eastern territory, where railway fares are highest. Meanwhile the latest returns show railway receipts as representing an investment of only 1½ per cent. on capital.

London and How to See It

London is a centre of pleasure, culture, history, or what you will, which is shared by numerous transport agencies. In general, apart from the publications of London Transport, it cannot be accused of monopolising an undue share of publicity literature. An illustrated guide and companion for the London visitor such as this one published by the Great Western Railway is therefore a relative novelty, and its title—"London and How to See it"—reveals it as a publication planned for the pocket of the sightseer so that he may plan his itineraries and perform them with the maximum comfort, pleasure, and safeguards against getting lost. Mr. Maxwell Fraser, F.R.G.S., supplies the text, and gives directions for twelve tours in London, starting from Paddington and using bus or Underground. In the centre of the guide are folding maps of London and suburbs, Central London (pictorial) with main sightseeing routes in red, and London theatres with their nearest Underground stations. An index of places of interest gives times of opening and admission charges, if any. The cover design and sketches in the text are by Frank Newbould. Numerous full-page photogravure illustrations will certainly beguile the visitor from afar, and may even persuade the Londoner himself to take renewed pleasure and interest in his surroundings.

Locomotives and Curvature One Hundred Years Ago

In *The Railway Magazine* for May, 1839, a letter to the Editor (dated from Debdale, near Mansfield, on April 18) was published from John Coke, of which the following is an extract:—

"About 20 years ago, a railway was laid between Mansfield and Pinxton, where it joins the Cromford Canal. The railway is 7¾ miles in length, and is laid over a rising ground, the summit being nearer to Mansfield than Pinxton, in the proportion of 4½ to 3¼, or thereabouts. The chief traffic upon it consists of coal taken from Pinxton to Mansfield, which of course ascends over the longest portion of the road, namely, from Pinxton to the summit. The steepest part of the road is 55 ft. a mile, the most level near 49 ft. a mile; besides this disadvantage there are some sharp curves. Hitherto all coals are taken up by horses, from conceiving that locomotive engines would not be available, having such an ascent as well as curves to contend with. As it is not possible to avoid curves altogether, the point on which I wish for information from you is, what is the sharpest curve on which an engine will act drawing a load of 10-15 or 20 tons, on an ascent such as that mentioned above. Three horses will draw about 10 tons in 3 waggons up the road."

In the July, 1839, issue a reply was published from Octavius Dunstan, Superintendent of the Bodmin & Wadebridge Railway (dated from the Railway Office, Wadebridge, Cornwall, May 27), as follows:—

"A branch of the Bodmin & Wadebridge Railway rises 1 in 50 = 105½ ft. in a mile. On this road there are sharp curves, and the rise very nearly regular. On this, locomotive-engines are regularly worked, taking from 22 to 33 tons, according to the state of the weather. On one occasion one of the engines (the *Elephant*, made by the Neath Abbey Iron Company) took 36½ tons, besides the weight of the engine and feeder = 15 tons. Eight wagons = 2 tons each, = 16 tons, *i.e.*, load 36½ tons + 15 tons + 16 = 67½ tons. With this load the engine ascended at the rate of 5½ m.p.h., which is the usual speed on that branch. . . . P.S.—We have worked the railway between four and five years. . . . Mr. Coke has not given the radius of the curves on the road to which he refers, and the word *sharp* being so much matter of opinion, I do not see how I can assist him further, except, I may say, that some curves on our road do not exceed a quarter of a mile radius, on which we work with coupled wheels. This, however, you will agree with me, is very objectionable, and it must depend on other circumstances how far an engine on such a road can be worked economically. The fact of the Mansfield road being in a coal district, is important in point of expenditure."

Victorian Railways Literature

Tourist areas of diverse attractions are described in a series of illustrated pamphlets we have received from the Victorian Government Railways. On the cover of one, a ski-jumper is seen in full flight, but only in the mind's eye of a figure dreaming in a comfortable fireside chair of the Mount-Buffalo national park and its winter sports possibilities. For less strenuous holidays at other seasons of the year, another pamphlet urges the claims of Daylesford and Hepburn springs, opening to show a picture map of the district with the different recreations available humorously presented. Those seeking an all-the-year round holiday area will doubtless incline to the Warburton district—a place of hills, woods, and rivers only fifty miles by direct rail connection from Melbourne. For camping enthusiasts, another attractive pamphlet describes the Buchan Caves neighbourhood, while more sophisticated pleasures are engagingly put forward in a similar publication dealing with Ballarat—"City of 100 charms."

Railway Share Market

Although the large borrowing plans for defence purposes and uncertainty as to how and when the new Government loan will be raised had a reactionary influence on gilt-edged stocks, other sections of the stock and share markets showed a moderately better tendency earlier this week. There was no appreciable improvement in the amount of business, but market sentiment was assisted by the rally shown by Wall Street at the beginning of the week and also by the absence of further unfavourable developments in the international situation.

Home railway securities reflected the surrounding trend and attracted rather more attention. The traffic outlook continues to be regarded as good in many quarters because the railways are well placed to benefit from the increase in industrial activity arising from the stimulus of armament and other Government work. Moreover, the past week's receipts were up to best expectations, and it is being assumed that the half-yearly statements, due next week, are likely to broaden market interest in the improving position of the railways. Great Western ordinary was favoured and rose strongly to 34¼, but later went back to 33¼. The 4 per cent. debentures were better at 97½ as was the 5 per cent guaranteed at 107. L.N.E.R. securities tended to respond readily to only a small improvement in demand, and the first preference rose sharply to 34¼, aided by the view that this stock may have interesting possibilities as a speculation on the hope of a small dividend payment if the upward trend in traffics is accelerated in the current half-year. The second preference, which rallied to 12¾, subsequently receded to 12¼, but the first guaranteed remained firmer around 73, as did the second guaranteed around 66. The 3 per cent. debentures were 63½ and the 4 per cent. debentures 84. L.M.S.R. preference stocks attracted rather more attention earlier in the week, but later reflected the surrounding trend on the Stock Exchange. The 1923 preference, however, had a relatively steady appearance around 43, but the first preference, after improving to close on 62, declined slightly to 61½. The 4 per cent. guaranteed was better at 83½, as were the 4 per cent. debentures at 91½. The ordinary stock was 14¾ at one time, but later eased to 14½. Market men are now becoming more hopeful that it may be possible to pay the full 4 per cent. dividend on the 1923 preference stock in respect of the current year, but it is realised, of course, that this will depend on the upward trend in traffic receipts being continued. Granted a return of strong speculative activity to the Stock Exchange, this stock and L.N.E.R. first preference would doubtless show a good deal of activity. There are, of course, numerous stocks which appear to offer generous yields, notably L.N.E.R. second guaranteed, and Southern preferred is also included in this category. The latter improved to 71¾ earlier in the week, but later declined to 70¼, while the deferred, which was 15¾, went back fractionally to 15½. London Transport "C" was around 73¾.

Argentine railway securities were again inactive, but earlier in the week various debentures and preference stocks attracted a few buyers. B.A. Gt. Southern 6 per cent. preference had a steadier appearance at 16½, as had Central Argentine 4 per cent. debentures at 50 and the 5 per cent. debentures at 53. Elsewhere San Paulo declined. French railway sterling bonds were also reactionary. Canadian Pacific shares and preference stock were better in sympathy with the trend of Wall Street.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1938-39	Week Ending	Traffic for Week: Total this year	Traffic for Week: Inc. or Dec. compared with 1938	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1938	Prices: Lowest 1938	Prices: July 19, 1939	Yield (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	16.7.39	17,280	+ 3,360	28	368,340	450,550	− 82,210	Ord. Stk.	14	7¼	6	Nil
	Argentine North Eastern	753	15.7.39	11,793	− 428	3	24,299	26,148	− 1,849	,,	6½	2	3½	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	82	75	62½	£3 8
	Bolivar	174	June 1939	4,650	+ 1,100	26	24,950	22,600	+ 2,350	6 p.c. Deb.	8	7	7	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	10	4	6	£5 16
	Buenos Ayres & Pacific	2,801	15.7.39	80,335	+ 7,072	3	174,938	165,757	+ 9,181	Ord. Stk.	61½	3¼	4	Nil
	Buenos Ayres Central	190	24.6.39	$140,100	+ $27,100	52	$5,293,600	$5,904,000	− $610,400	Mt. Deb.	15½	8	11	Nil
	Buenos Ayres Gt. Southern	5,082	15.7.39	120,593	− 3,784	3	265,199	287,717	− 22,518	Ord. Stk.	17⅝	8½	7½	Nil
	Buenos Ayres Western	1,930	15.7.39	42,308	+ 3,164	3	91,502	89,329	+ 2,173	,,	12¾	5	6	Nil
	Central Argentine	3,700	15.7.39	148,452	+ 39,066	3	294,063	243,632	+ 50,431	,,	13¼	5¾	6½	Nil
	Do	—	—	—	—	—	—	—	—	Dfd.	6	2½	3	Nil
	Cent. Uruguay of M. Video	972	8.7.39	17,781	− 223	2	19,582	22,281	− 2,699	Ord. Stk.	3	1¼	1	Nil
	Costa Rica	188	May 1939	24,302	+ 2,198	48	245,516	283,030	− 37,514	Stk.	28	22½	23⅛	8½
	Dorada	70	June 1939	13,800	− 2,700	26	80,600	95,700	− 15,100	1 Mt. Db.	105¼	104	102½	5⅞
	Entre Rios	810	15.7.39	18,548	+ 2,562	3	39,863	35,030	+ 4,833	Ord. Stk.	7¼	3½	4	Nil
	Great Western of Brazil	1,092	15.7.39	5,000	+ 100	28	211,000	192,900	+ 48,100	Ord. Sh.	3/-	1/-	¼	Nil
	International of Cl. Amer.	794	May 1939	$516,275	− $11,817	21	$2,800,928	$2,584,878	+ $216,050	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	6d.	6d.	½	Nil
	La Guaira & Caracas	22¾	June 1939	6,790	+ 2,190	26	35,430	30,235	+ 5,195	Stk.	8	6½	7½	Nil
	Leopoldina	1,918	15.7.39	22,059	+ 1,307	28	533,551	521,530	+ 12,021	Ord. Stk.	4	1	1	Nil
	Mexican	483	14.7.39	$243,500	− $70,300	2	$522,400	$574,500	− $52,100	,,	¼	1/16	⅛	Nil
	Midland of Uruguay	319	June 1939	6,839	− 594	52	103,758	111,938	− 8,180	,,	⅞	½	½	Nil
	Nitrate	386	15.7.39	4,688	+ 225	28	65,564	85,296	− 19,732	Ord. Sh.	52/9	19/16	15/4	7⅛
	Paraguay Central	274	15.7.39	$4,023,000	+ $622,000	3	$8,072,000	$7,592,000	+ $480,000	Pr. Li. Stk.	60	55½	40½	14⅝
	Peruvian Corporation	1,059	June 1939	59,567	− 7,164	52	785,648	946,133	− 160,485	Pref.	5¾	1¾	1	Nil
	Salvador	100	8.7.39	¢10,475	− 4825	2	¢12,132	¢14,017	− ¢1,885	Pr. Li. Db.	23	20	19½	Nil
	San Paulo	153½	9.7.39	30,625	− 2,707	27	849,901	891,043	− 41,142	Ord. Stk.	64	28	23½	8½
	Taltal	160	June 1939	2,455	+ 160	52	33,700	39,100	− 5,400	Ord. Sh.	15/16	1/2	½	10
	United of Havana	1,353	15.7.39	17,536	+ 1,167	3	35,658	33,902	+ 1,756	Ord. Stk.	3⅝	1½	1	Nil
	Uruguay Northern	73	June 1939	694	− 207	52	11,341	11,259	+ 82	Deb. Stk.	2	1	2	Nil
Canada	Canadian National	23,762	14.7.39	711,286	+ 73,642	28	18,897,380	17,781,428	+ 1,115,952	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	72	60	68½	5⅝
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	104	90	96½	4⅛
	Canadian Pacific	17,171	14.7.39	505,800	+ 18,000	28	13,338,200	13,221,800	+ 116,400	Ord. Stk.	8⅞	4¼	4⅝	Nil
India†	Assam Bengal	1,329	30.6.39	38,775	− 2,374	13	349,413	343,195	+ 6,218	Ord. Stk.	81½	70	71½	4⅝
	Barsi Light	202	30.6.39	8,340*	+ 4,597	13	33,937	34,740	− 803	Ord. Sh.	60½	54¼	50½	5⅝
	Bengal & North Western	2,112	30.6.39	69,770	− 5,625	13	721,314	797,948	− 76,634	Ord. Stk.	311	278	256	7⅛
	Bengal Dooars & Extension	161	30.6.39	3,975	+ 248	13	27,102	32,582	− 5,480	,,	89	83	91½	7⅛
	Bengal-Nagpur	3,272	30.6.39	208,050	+ 6,645	13	2,023,372	1,882,863	+ 140,509	,,	95½	90	90½	4⅞
	Bombay, Baroda & Cl. India	3,085	10.7.39	192,300	− 16,200	14	2,508,300	2,578,950	− 70,650	,,	112⅞	95	104½	5¾
	Madras & Southern Mahratta	2,947	30.6.39	173,175	+ 12,946	13	1,597,709	1,516,273	+ 81,436	,,	108	97	102½	7⅛
	Rohilkund & Kumaon	571	30.6.39	15,097	+ 173	13	145,920	164,919	− 18,999	,,	308	285	268	6¾
	South Indian	2,531¾	20.6.39	115,328	− 2,071	12	947,003	959,876	− 12,873	,,	104	101	96½	5⅜
Various	Beira-Umtali	204	May 1939	88,259	—	35	636,331	—	—	—	—	—	—	—
	Egyptian Delta	623	20.6.39	4,814	+ 190	12	39,934	40,312	− 378	Prf. Sh.	⅞	5/6	½	Nil
	Kenya & Uganda	1,625	May 1939	206,557	− 11,295	21	1,220,870	1,309,332	− 88,462	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	49	41	40	8¾
	Midland of W. Australia	277	May 1939	14,100	− 2,469	48	165,763	164,159	+ 1,604	Inc. Deb.	93¾	89	89	4½
	Nigerian	1,900	3.6.39	24,155	− 432	10	275,542	290,236	− 14,694	—	—	—	—	—
	Rhodesia	2,442¾	May 1939	365,832	—	35	2,880,230	—	—	—	—	—	—	—
	South Africa	13,284	1.7.39	691,223	+ 25,111	14	8,461,247	7,965,557	+ 495,690	—	—	—	—	—
	Victoria	4,774	April 1939	796,751	− 81,321	43	7,865,959	8,228,216	− 362,257	—	—	—	—	—

NOTE. Yields are based on the approximate current prices and are within a fraction of 1/16

* Ashadi Fair. † Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being over estimated. The statements are based on the current rates of exchange and not on the par value